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FCC Releases Report

'Separate' DP Services Favored for Carriers

By Edward J. Bride
CW Staff Writer

WASHINGTON, D.C. – The Federal Communications Commission (FCC) has decided that regulated common carriers should be prohibited from providing data processing services unless they establish separate and independently competing corporate entities.

Hands-Off Policy

In a related finding, the commission favored a hands-off policy for data processing service companies employing communications facilities to link subscribers. This policy was qualified with the provision that the hands-off position would be re-examined if abuses emerged to impede the competitive environment.

The far-reaching report terminated the FCC's four year computer inquiry.

The commission also concluded that, in instances where message-switching is offered as an integral part of a package that is primarily data processing oriented, a "total regulatory forbearance" should exist. The only qualification in this ruling is that in the case of a common carrier a "hybrid service" should be offered only by the carrier's separate affiliate.

In presenting these recommendations last week, the FCC carefully cited related studies including those undertaken by the Stanford Research Institute and the National Academy of Sciences. In addition, the historical and legal precedents that affected the findings were documented in detail, especially as regards the FCC's jurisdiction over the questions covered in the report.

Since the commission's findings are tentative, comments from interested parties due by May 15 will be considered before the recommendations become binding.

'Separate Corporate Entities'

For those carriers already providing data processing services, the FCC concluded that these firms should be given six months to disestablish themselves from the services and set up "separate corporate entities."

The commission sidestepped one question it was investigating: the privacy of transmitted data. The report noted that the "social and public policy implications . . . go well beyond the pale of our jurisdiction over communications."

However, the report did take note of the current study by the National Academy of Sciences, which is conducting an investigation into public and private data banks, "to determine the magnitude of the threat to individual privacy," the FCC said.

The report noted that the commission has broad power over "communications facilities and services not in existence, or even anticipated" under the Communications Act of 1934.

However, there would be "no public interest requirement" for regulation of data processing activites, the report said.

The FCC added that, as long as the data processing industry retains its present competitive structure, it would not be treated as a common carrier, or be subject to regulation.

'Ample Jurisdiction'

The commission claimed "ample jurisdiction" to prevent common carriers from engaging in data processing, if such activity endangered the efficiency of the communications functions.

The decision called for "maximum separation" of corporate functions, and said that carriers "who may not have already established such arrangements [must] separate their communications activities from the sale of data processing services within six months from the effective date of any rules adopted to implement this policy."

Friden System Can Multiprogram 20 Jobs Through Hardware Control

By Drake Lundell
and Frank Piasta
CW Staff Writers

NEW YORK – A small computer system, with the ability to multiprogram up to 20 applications and to use a large variety of peripheral devices, including communications adapters, was introduced last week by the Friden Division of the Singer Co.

A key feature of the System 10 is the ability to achieve multiprogramming through hardware control. This eliminates the need for elaborate executive operating software programs, according to Friden.

The cycle time of core memory is 3.3 μsec. Internal code is six-bit Ascii. Memory starts at 10K bytes and is expandable in 10K modules to a maximum of 110K bytes.

An unusual restriction is that no program may use more than one 10K partition, thus making additional memory usable only if multiprogramming is used. Thirteen basic instructions, including hardware Multiply and Divide, are standard.

Two types of channels are fitted. One high-speed channel similar to a selector channel is fitted to every System 10. This is used to service high-speed devices such as disk drives and magnetic tape drives. One low-speed channel, used to connect low-speed devices, such as card readers and punches, and paper tape devices to the system, is standard.

As many as 10 devices can be attached to the low-speed channel, each device being serviced sequentially, rather than being multiplexed. A maximum of 19 additional low-speed channels can be accommodated giving a total of 200 low-speed devices.

Among the peripheral equipment offered are communications devices. Synchronous communications adapters that are Ascii-oriented and can operate in half- and full- duplex modes over leased or dial-up lines at 2,000 to 2,400 bit/sec are available.

Interfaces are provided to 201 Data Sets, RS 232 D Synchronous communications sets, and Friden's line communications adapter that can handle as high as 300K byte/sec to the high-speed channel. The low-speed channel can be used with ACA 1 (Asynchronous Communications Adapter 1), which can interface through a 201 data set, half- or full-duplex. The ACA 2 adds dial-up capabilities to those of the ACA 1.

Peripherals that may be added to the system include:

- A model 30 card reader, rated at 300 80-column card/min, reads photoelectrically and has a read-only memory to convert Hollerith card code to internal Ascii code. The unit incorporates its own two-card buffer.
- A Model 35 card punch, punches at a rate of 100 card/min into 80-column cards. This device also uses a read-only memory for code conversion. A two-card buffer is also incor-

(Continued on Page 4)

Corning Terminal Uses Photochromic Glass To Eliminate Need for Image-Refreshing

By Frank Piasta
CW Staff Writer

NEW YORK – A new display terminal uses photochromic glass to eliminate the need for image-refreshing and to provide truly flicker-free images.

Photochromic glass darkens when exposed to ultraviolet light. This property is used to retain images within the terminal until they are erased with red light.

The technique also enables the terminal to produce hard copy without using photographic methods.

The terminal was described in a paper presented by G.K. Megla of the Corning Glass Works, Raleigh, N.C., at the annual IEEE show here.

The terminal, scheduled to be shown for the first time this week and to be available for delivery in the near future, will be produced by a Corning subsidiary, Corning Data Systems.

The use of photochromic glass makes it unnecessary for the computer to refresh the image or for the terminal to have a buffer memory for refreshing the image.

The image is formed in a 3 in. by 3 in. CRT on a target made of fiber-optic material, using photochromic glass cores. This glass darkens on contact with the ultraviolet light used as a scanning beam in the CRT.

A probing lamp is used to illuminate the image retained by the target for projection onto an 8-1/2 in. by 11 in. rear projection screen by means of a system of lenses and mirrors. This projected image can be diverted onto an electrostatic printer to produce hard copies.

(Continued on Page 4)

Westin Study

Data Bank Committee Meets, Only 13 Attend

By Joseph Hanlon
CW Staff Writer

WASHINGTON, D.C. – Ralph Nader attended; Nicholas de B. Katzenbach, vice-president of IBM, sent an alternate: and nine of the 22 committee members, including most of the "big names," didn't attend or send an alternate.

The meeting March 28 was the first by the advisory committee of the National Academy of Sciences study of computerized data banks [CW, March 18].

Dr. Alan F. Westin, who is heading the study, told CW that he did not "attach much significance" to the absence of many members. He noted that "all different viewpoints were represented" at the meeting. Finally, he said that when the group was set up, "we assumed that we couldn't ever get all of these people into one room at one time."

Details of the meeting are not being released to the press.

Westin said that he discouraged the sending of alternates by those who could not attend, and said that he would be in contact with those people.

CW contacted the offices of seven of the nine committee members who did not attend, and asked their reasons. Three cited vacations, three cited other commitments, and one said he would not travel to Washington for meetings.

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Programmers Hit at Symposium, Poor Training Cited

By Phyllis Huggins
CW West Coast Bureau

LOS ANGELES–Programmers were thoroughly criticized in a session at the expanding uses of computers in the 70s" symposium at the University of California at Los Angeles March 30–April 1.

Dr. Richard W. Hamming of Bell Telephone Laboratories said that the industry will get rid of programmers in 10 years–because they just aren't worth it.

Dick H. Brandon, president of Brandon Applied Systems Inc., said: "No, it will take 20 years. They will unionize in the meantime and we'll have to have some of them around as standbys."

Growing Resentment

The antagonism toward programmers shown by the two speakers is symptomatic of growing resentment among senior members of the industry over the programmer situation.

In an interview, Hamming said programmers are myopic, they deal in little details all the time and lose the broad view all together.

"Further, they have megalomania. They believe that a computer can do anything and that, therefore, they can do anything," he said.

"They act as though they were artists. They do whatever they want to do and make other people like it without regard for what is needed. They are illiterate. They don't know what anyone else is doing and they don't want to find out. They are totally unable to read the other guy's program, but of course he never left any record, anyhow.

"Look at our operating systems," Hamming pointed out. "They don't think how simple a system they can build, but how elaborate. In so doing, the manufacturer makes everybody inefficient and there are bugs for everybody.

"Some of the problems are just frills some programmer wants and they cause trouble for everyone. These guys are building systems for the fun of it and management can't control it."

Hamming observed that the industry had obsoleted the binary programmer and the person who did not upgrade is no longer around. "We will keep the problem solvers, that is where the emphasis belongs. But those who just put things on the machine will go." Software will be built by standard methods.

Better Software

He recommended harsh methods to motivate better software. "If the user was paid $1,000 or $10,000 for every bug he found, we'd find more care taken. It costs the user that much.

"For software houses there should be an acceptance test–the software proves out or the company gets nothing plus penalties. Double or nothing. Then users would buy.

"By the end of this decade we will get software reduced to its reasonable price. Hardware went the same way. In any other field would you have found acceptance for anything that performed as badly as the IBM 360 in the early days? Now we are past this. We expect more."

Brandon emphasized that the industry was heading for chaos and waste if corrective steps weren't taken. Half facetiously, he noted that the industry has enough line printers hooked up to enough computers to produce 1,200 pages of information for every man, woman, and child in the U.S. per month.

By 1980, with a projected computer population of 300,000, the industry will be able to produce three trillion pages of information a month or 14,000 pages for every man, woman, and child. "Have you read your 1,200 pages this month?" he asked the audience.

Poor Training

Both Hamming and Brandon decried the training being given in universities. As Hamming put it, "I know one man who refuses to hire university graduates in computer science anymore. All they want to do is play games. They don't know how to put anything real on the machine like a payroll." Brandon said that there is no motivation to do well on the job.

There are plenty of jobs. There is no economic pressure, and no fear about losing a job, he said. "We have high school graduates who have been programmers for three years and are making $13,000. They doubled their income in three years. How can they possibly be worth what they are getting and what do they do for an encore."

Lack of Communication

On the problem of lack of communication between the different groups, Brandon said that the answer to that was documentation. He said: "Documentation is like sex, you can never get enough of it and if it is good it is very good and if it is bad, it is better than nothing."

His final solution for all of these problems is complete education and training for all categories of personnel, plus the standards and discipline to restore control–a basic systems discipline and the management discipline. Finally, he said: "Better software, better communication channels and more constructive attitudes are all part of our need in the future."

Army Admits Data Banks Exist–– 'Reviewing Policy'

By Joseph Hanlon
CW Staff Writer

WASHINGTON, D.C. – The Army has admitted the existence of at least one more data bank on lawful civilian political activity, and is canvassing its own intelligence operations to find out if there are any others.

In addition, the Army has acknowledged the accuracy of charges made in CW [March 11] and elsewhere that there has been no change in the policy as to the collection of data, and that other non-computerized data banks of civilian activity still exist.

Army Issues Directive

The Army's admissions are contained in a directive from Secretary of the Army Stanley R. Resor, dated March 6 and just recently released, and in a letter from Under Secretary of the Army Thaddeus R. Beal to several congressmen.

The Resor directive, "Restrictions on Intelligence Operations Involving Civilian Activities," thanks three generals for the action to eliminate "computer data banks [plural], containing information on civilians." This is the first admission by the Army that there has ever been more than one such data bank.

The directive asks all intelligence unit commanders "to report whether their command has any form of computerized data bank relating to civilians or civilian activity, other than data banks dealing with routine administrative actions," and orders the command to either "destroy" the data bank or request special permission to keep it.

Finally, Resor admitted that the Army is still only reviewing its policy of "direct overt observations of incidents in progress" and of "spot reporting." This could mean that the 1,000 Army intelligence field agents are still collecting information on union meetings, strikes, church meetings, political meetings, and non-violent protests.

Army Refuses Comment

The Army has refused to make any comment on its data banks since early last month, but apparently even where it claims to have "destroyed" computerized data banks, it has kept the original data, and possibly data tapes and software as well. "Destroyed" may only mean that computers are no longer being used to access the data.

The Army has cited other more pressing matters, such as providing information on the Army's handling of the mails. More recently, it said that it couldn't answer questions because of the ACLU (American Civil Liberties Union) suit against the Army.

Meanwhile, a full hearing on the ACLU request for an injunction against the Army's collection of data on civilians has been set for April 22 in the U.S. District Court here [CW, Feb. 25].

In its suit, the ACLU charges that the Army's surveillance "casts a pall over lawful political protest" and deters people from exercising their First Amendment rights "for fear they will be made subjects of reports in the Army's intelligence network [and] that permanent reports of their activities will be maintained in the Army's data bank."

Teletype Network

In addition to compiling reports on incidents and individuals, the Army also circulates reports through to Army posts throughout the country by Teletype. The ACLU suit contains as evidence the Teletype reports for March 13, 14, and 18, 1968.

Events reported in those teletype reports include:

- 20 people picketing the federal building in Hartford, Conn.
- 35 persons demonstrating at Fort Hamilton in Brooklyn.
- An anti-draft meeting in Philadelphia.
- A speech at Emmanual Methodist Church in Detroit.
- 21 pro-Vietnam war pickets at the White House.

All were without incident, according to the Teletype reports.

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. . . And Now a Service Bureau Provides '70 Census Data Tapes

ARLINGTON, Va. – Want to know how many people on your block share their bathrooms or the average rent of the people on your block?

Now you can find out, thanks to the 1970 census conducted last week. And a service bureau here is anxious to help you.

Starting in August, the Census Bureau will begin releasing an estimated 1,700 data tapes, at a charge of $60 each. Statistical summaries of census questionnaire answers will be listed by city, by census tract (about 5,000 people), and by city block. Such summaries provide a detailed profile of the area.

Critics have charged the Census Bureau with issuing misleading publicity on the confidentiality of the census. Although data from individual census forms is kept strictly confidential, few people realize that statistical summaries cover such small areas as city blocks.

And the Census Bureau is not volunteering this information. The instruction sheet for filling out the census form has a set of questions and answers. One, reading "Are your answers really confidential?", explains, "Yes. Answers may be used only for statistical purposes in a table like this one." The table given as an example lists the numbers of people in various age groupings nationally. There is no suggestion that smaller statistical units are used.

'Put Data to Work'

Not everyone agrees with the critics, however. John Beresford is encouraging people to make more use of census data. "I find it distressing that the country spends $220 million on the census and only $2 to $4 million is allocated to producing statistics."

So Beresford, after 11 years with the Census Bureau, set up his own company, Data Use Access Laboratories (Dualabs), "to help people put the data to work."

Dualabs now has 30 subscribers (at a cost of $5,000 to $8,000 per year) for a service which provides access to the census tapes, plus much of the software for reading the tapes, extracting data, and displaying information.

According to Beresford, his subscribers include mailing list houses (Polk), cities (New York), states (Washington), universities (Johns Hopkins), and banks (Manufacturers-Hanover).

Most commonly, Beresford said, users of census tapes come with information of their own which they wish to expand by the use of census data. A commerical firm with a list of clients could learn more about those clients, on a statistical basis, by comparing clients with census information about the block on which each lived.

For example, a company could study the characteristics of blocks where its product sold well, and then concentrate on other blocks with the same characteristics.

Another use, he said, would be to help pick a location for a store near a maximum number of potential customers.

The first census tapes cover wide areas such as cities and census tracts. Then, there will be 266 tapes of data providing profiles of 1½-million city blocks in urbanized areas. These tapes contain 250 pieces of information from the short census form, which most people filled out, with questions primarily on housing.

The tapes will contain only a few statistical correlations, primarily things like age, sex, and race correlations, Beresford said.

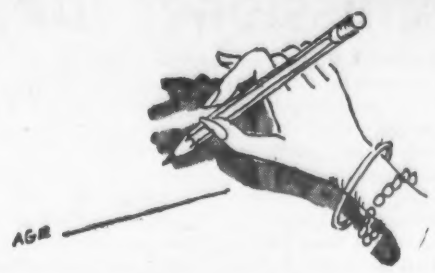
Then there will be 1,000 tapes of summaries, by census tracts, of answers to the longer questionnaires.

All told, Beresford said, there will be 1,700 tapes available by the end of 1971.

But the Census Bureau will provide special tabulations, for a price, Beresford noted. Since these require that the Census Bureau go back to the original forms, the bureau does the work and charges the user.

Special tabulations go through a "disclosure analysis," according to Beresford, to make sure that too detailed information is not released. Beresford complained that "the Census Bureau rules for supression are not publicly announced," which creates some problems for the users.

Beresford said that providing census data is not really Dualabs' main business. "We got into it to prove it can be done. We think the government should do it," he said.



No one can ever find out anything from your census form

No one? No one! All the information you enter on your Census Form is a private matter between you and our computer. Even your age.

Some critics claim this advertisement from a Census Bureau ad is misleading.

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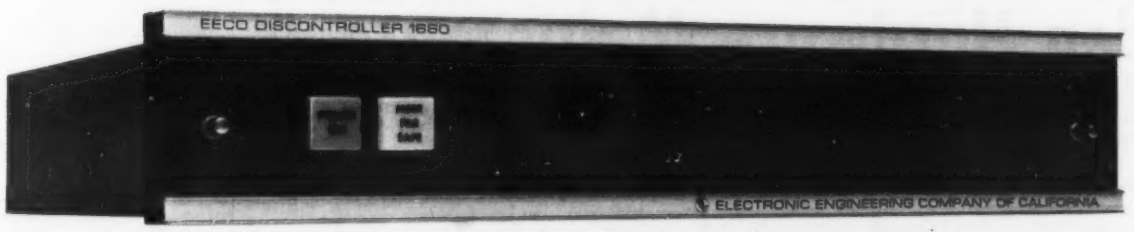

EECO's new 1660 Discontroller is designed to interface a wide range of 16 bit minicomputers to IBM 2311/14 type disc drives. The Discontroller features light weight slim line design; easy connection to computers I/O bus; high data compaction format; and simple software. And it's available 60 to 90 days after receipt of order. All models include complete computer interfaces and power supplies. Write or call us for our free literature. Have a special requirement? Tell us what combination of computer and disc drive you want to put together. You'll have a quotation within the week and a prototype unit in 60 to 90 days.

Controllers for Data General Nova/2311 – $4875.00 in lots of 50.
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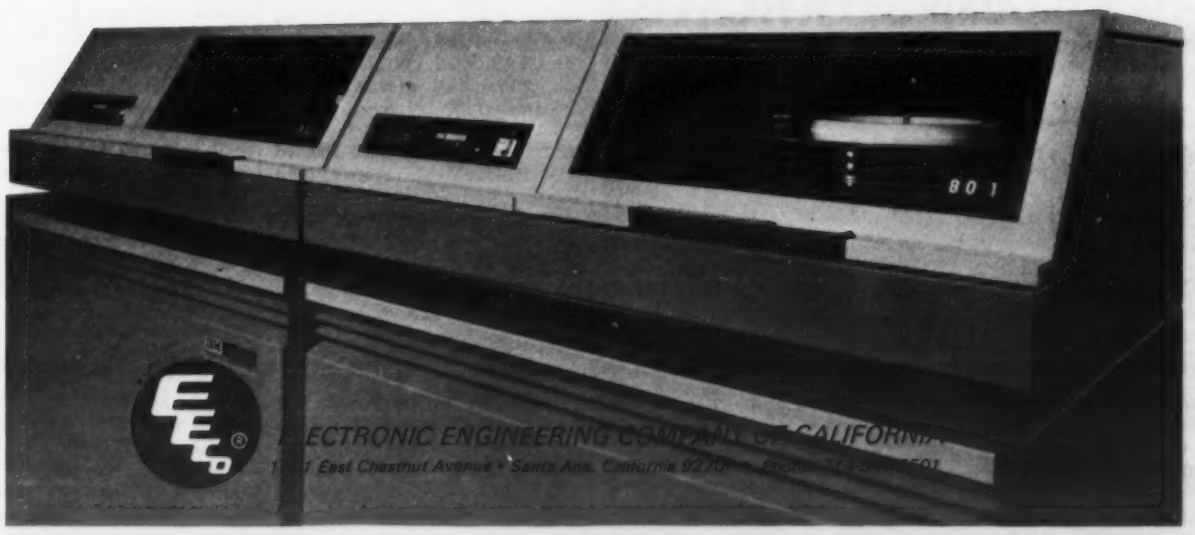

Commissioner Defends Report on Mass. DP Misuse

By Edward J. Bride
CW Staff Writer

BOSTON – Despite charges that it was plagiarized from a Maryland report, the Massachusetts study of mismanagement in data processing is being defended by the author's supervisor.

The supervisor is state Administration Commissioner Donald R. Dwight, who released the report of waste and misuse last month [CW, April 1].

Criticism came from both sides of the political fence, notably from past administrator Anthony R. DeFalco, a Republican like Dwight, and from Democrat Beryl Cohen, a state legislator.

Another Democrat, Charles Flaherty, said he doubted the charge of plagiarism levied by Cohen.

Dwight said that Alvin Kaltman, author of the report, had examined all available state reports before preparing "this working paper."

He added: "I accept the findings as describing the conditions in Massachusetts."

Same Problems in Maryland

The plagiarism charge stems from the inclusion of several lines from a similar report for the state of Maryland last summer. At that time, Kaltman was working for Computer Applications Inc. in Maryland, and said he was aware of that state's computer problems.

When he came to Massachusetts in August, Kaltman said he found the same type of problems that existed in Maryland.

Since the Maryland report "depicted the Massachusetts problems beautifully," and since the report was originally intended for internal dissemination only, Kaltman said he informed his boss that some of the phraseology would come from the Maryland report.

What is important, said Kaltman, "is the problems, not the wording. Massachusetts is not the first state to have computer problems."

DeFalco criticized Kaltman's capability to compile the report. He said that he wouldn't even have interviewed Kaltman for the job he now holds, that of director of the state's Bureau of Systems Analysis, Data Processing and Telecommunications.

Unanimously Selected

During a public hearing requested by DeFalco last week, the former administrator praised one member of the tribunal which interviewed about 25 candidates for the job. Kaltman was chosen unanimously; the other members of the board were Dwight and an assistant.

As director of the bureau, Kaltman's first official duty was compiling the report on the status of data processing within the Commonwealth.

Flaherty said that he reached many of Kaltman's conclusions.

These conclusions included numerous charges of lack of systems design, misuse of expensive systems, and personnel incompetence.

As a result of the report, Dwight introduced legislation to make permanent, and provide additional staffing, for a Bureau of Information Systems.

Could Save Millions

Such a permanent bureau, said Kaltman, could save the state almost $3 million in direct costs next fiscal year.

The state legislature is scheduled to conduct public hearings this month, to investigate purchase procedures for EDP equipment. Kaltman is expected to testify, and to name individual agencies charged with waste or misuse.

A legislative committee to investigate Dwight's proposal for a permanent DP bureau has not been named. When such an investigation is undertaken, it will undoubtedly be a standing committee which will perform it, such as Ways and Means or Public Service.

Next month, Kaltman is scheduled to be chairman for a panel discussion on "Computing in State Government" at the Spring Joint Computer Conference.

DeFalco, currently a private management consultant, said that Kaltman's report was derogatory and contemptuous.

DeFalco served as administrator under Gov. John A. Volpe, but resigned when Volpe became transportation secretary and John Sargent was elevated from lieutenant governor.

DeFalco is reported to be interested in the post of lieutenant governor.

Corning Unit Uses Glass Memory

(Continued from Page 1)

A dichroic layer is deposited between the ultraviolet phosphor and the target plate that permits passing of the ultraviolet for darkening the target and reflects the blue-green light used for probing.

A dichroic substance is one that reflects light of one color and transmits light of other colors.

The probing light has very little effect on the optical density of the photochromic material. Symbols on the photochromic plate are formed by a 5- by 7-dot matrix. After magnification, the projected characters have a size of about 2.4mm by 3.4mm on the screen.

The stored information can be erased by the movement of a red light in front of the CRT. This light is moved mechanically, controlled by a push-button. Three to four seconds are required for erasing, Megla said.

Fast Writing Speed

The main advantages claimed by Megla for the device are:

- The writing speed is fast since no chemical or thermal development process is involved.
- The image is flicker-free. Full-size 8-1/2 in. by 11 in. images are displayed without requiring a large CRT.
- The brightness of the display is independent of the CRT phosphor output and, therefore, full size-hard copies can be provided without employing photographic techniques.
- The lifetime of the storage and display component is not limited as when an organic photochromic material is used. The image is retained over sufficient time and fast erasure is possible. (At present, no method of erasure short of full-screen is available. This point was brought out in the discussion following the paper).
- Character and vector generation and position pointer can be provided. An overlay for forms, graphs, maps, etc. can be inserted into the light path thus relieving a computer or communication link from handling such information.

The method described in the paper has been incorporated in the Corning CDS 904 graphics display terminal. This unit, rated at 15 char/sec, is said to also provide for the selection of screen overlay slides from a tray of slides that can be placed in the terminal by the user. This is said to avoid the redrawing of commonly used grids.

The CDS 904 is scheduled to be introduced at a press conference this week and will be priced in the $20,000 range.

The device was produced, satisfying all of the above parameters, according to the paper.

Interactive Terminals

Also presented at the same IEEE session, "Interactive Terminals–The Search for Cost and Performance," were: "The Standard Pushbutton Telephone as an Interactive General Computer Terminal", "Magnetic Tape Data Terminal for Medium Speed Communications", and "Design Tradeoffs in a Low-Cost Programmable Graphic Display".

The first of these, written by D. B. Smith and F. H. Westervelt of the University of Michigan Computing Center, discussed a system for using a standard pushbutton telephone as a general interactive terminal. The system has been in regular use at the University of Michigan for more than a year and allows the user to present completely general alphanumeric input through a code that is said to be readily learned. The computer returns it's output through digitally synthesized speech.

This plan is said by the authors to make the computer accessible to students, housewives, executives, scientists, and other new users.

The second paper, by I. S. King of the Teletype Corp., described a tape device introduced last fall which is claimed to bridge the gap between standard speed teleprinters and high-speed data communications systems. The 4210 magnetic tape data terminal is a basic communications set capable of sending and/or receiving data at speeds up to 2,400 word/min.

The 4210 uses a tape cartridge that is capable of storing 150,000 characters. In addition to the tape handler, the unit includes a control panel, forming the operator interface; and contains the power supply and interfacing logic.

The method of recording modular design and dual speed capability is said to give the 4210 terminal a competitive edge over comparable medium speed tape send-receive data terminals.

The last paper of the session, by E. W. Pughe and J. E. Cunningham of the Imlac Corp. The paper described the procedure gone through by that company in the design of a PDS-2 CRT terminal that was to sell for less than $10,000 and still be flexible enough to allow the same hardware to satisfy many user requirements.

Other contraints were: that a basic graphic capability, as well as an alphanumeric capability must be present; that communications to a remote computer must be through standard interface with no special software required; and that components must be readily obtainable.

Friden Hardware Multiprograms

(Continued from Page 1)

porated. A read-after-punch check is performed.

- A Model 40 disk drive has a storage capacity of 10 million character-module, with up to 10 modules attachable to one System 10. Record length is restricted to 100 characters. Friden rates the unit at 73 msec, average access time, with a data transfer rate of 229K char/sec.
- A Model 45 magnetic tape unit reads and writes on 1/2-in. tape and is available in either seven- or nine-track models. The nine-track unit handles 800 bit/in. at a transfer rate of 20K char/sec, and is Ascii- or Ebcdic-compatible. The seven-track device handles 556 or 800 bit/in. at transfer rates of 20K or 13K char/sec. It is Ebcdic- compatible. Both units pass tape at 25 in./sec.
- A Model 50 line printer is a drum printer featuring a two-line buffer. It has a print speed of 450 line/min and a print line width of 132 characters. The print set is 64 characters.
- A Model 60 paper tape reader accepts tape punched in any code, Friden said. Reading is photoelectric. The unit may operate in a strip mode which allows the operator to feed short strips of tape to the reader. The maximum speed is 300 char/sec.
- A Model 65 paper tape punch allows the system to provide punched paper tape output at 110 char/sec. It will punch oiled or unoiled paper tape, mylar/paper laminate, and mylar/foil tapes.
- A Model 70 workstation, said to be a simplified terminal for System 10, allows an operator to communicate directly with the Model 20 processor or an on-line disk drive, Friden said. The unit incorporates a heavy-duty typing unit that may be used as a typewriter, off-line. If features a printing speed of 24.4 char/sec, max.

A 135-character print line, is standard, with a 175-character line optional. The keyboard has 64 alphanumeric characters and incorporates an operator display panel.

System 10 terminals may be placed up to 2,000 feet from the CPU, with just a two-wire line connecting them, Friden said. Communication with other computer systems is handled via common-carrier telephone lines, the firm added.

According to Friden, an easy-to-use assembler, similar to Autocoder, and a full complement of basic utility programs will be available to System 10 users. A simulator, written in Fortran, allows the assembly of System 10 programs on Fortran-equipped computers. No higher-level languages are currently available, although the company said that RPG is being investigated.

The System 10 prices will range from under $30,000 to over $150,000, depending on the number of peripherals and the complexity of the system, Friden said.

A batch processing system, including a processor with 10K of core storage, card reader, card punch, and line printer, will sell for approximately $44,000, or rent for under $1,400/mo. A multi-terminal configuration, with a 10K processor, 10 million characters of disk storage, and five work stations, is priced at $42,250 and leases for $1,355/mo.

A complete software and support program including education, service, and field engineering will be available with the first deliveries of the system in September, Friden said.

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FCC Utilizes Computer to Analyze Telephone Services

By Ronald A. Frank
CW Technical News Editor

WASHINGTON, D.C. – The Federal Communications Commission (FCC) is developing computer programs to analyze monthly reports on the quality of telephone service. The data is being furnished to the FCC by the Bell System operating companies and independent carriers as part of a plan established by the common carrier bureau to measure the quality of service being provided to customers.

The programs are being written for the common carrier bureau by the FCC's Economic Studies Division. In explaining the software being developed, Dr. Boyd Nelson, who heads the economic group, told CW that the FCC will be using a Univac 9200 computer system as a front-end processor to the 1108 remote batch system being operated by the National Bureau of Standards (NBS).

Nelson said the software will concentrate on isolating trends primarily connected with the economic impact of service quality. He added that his group is providing the software support for data that will be furnished by the common carrier bureau.

Nelson said that although the FCC has for some time operated a Univac III system, the installation of the 9200 system, scheduled for May, will mark the first time the FCC will have the capability to use a large computer such as the 1108.

Communications

The 9200 system will be installed at the FCC's facilities and will include tape and card off-line processing to provide batched data entry into the NBS system, he said.

In discussing the type of data to be entered into the computer, Mervin Alexander, public utilities specialist for the FCC, said the data being made available by the carriers will give the commission "an overall view of significant key areas [of service]."

The common carrier bureau has been accumulating data for analysis by the programs. Although such factors as geographic location, seasonal changes, and calling habit patterns were felt to have an effect on the relative quality of services being provided by the carriers, Alexander said it was still too early to make any definite statements.

Alexander said that as more data is accumulated, the bureau will probably issue periodic reports on significant trends pinpointed by the computer analysis.

He added that the carriers are providing data on the service quality of both the direct dial network and dedicated private line networks. Figures being received by the bureau cover such areas as troubles encountered in serving area and average clearing times required to rectify service problems, he said.

Companies chosen by the commission to furnish service reports on selected areas or exchanges in their operating territories serve approximately 107.6 million stations, 94.0 million in Bell System areas and 13.6 million in the areas of independent companies.

Information on the content and progress of the program has been provided to the U.S. Independent Telephone Association and the National Association of Regulatory Utility Commissioners, the FCC said.

The service quality reports were initiated after recent problems occurred in several states. In New York, where service impairment is most aggravated, the state public service commission recently ordered New York Bell to stop promotional advertising and all other promotional activities designed to attract additional customers or increase telephone usage until satisfactory service is provided.

In California and Florida, the FCC said, portions of rate increases have been withheld by the state utilities commissions until satisfactory service is provided.

'Time' System Allows Multiple File Access For Terminal Users

HOUSTON – Shaw Systems Associates, Inc. of Houston has available a telecommunications monitor called Time (telecommunications information management executive).

Time is a responsive, modular real-time telecommunications management system that enables diverse users to share a single computer memory partition and access multiple data files concurrently from remote on-line terminals, the company said.

Time will run on an IBM 360/25 or larger and is compatible with both DOS and OS. Processing modules may be written in Cobol, Fortran, or Assembly Language and may be either transient or core resident as desired.

The system has been implemented on an IBM 360 with multiple terminal devices and applications in less than 32K of memory.

Time facilitates rapid expansion of telecommunications activities through the addition of applications, files, terminals, and terminal types. This expansion is accomplished with minimum additional equipment and programming costs and no interruption or modification of existing on-line applications, the company claimed.

The advantages accrued from the modularity and flexibility of the Time system concept and design make the computer accessible on a real-time basis to all departments and areas of a business or organization.

Shaw Systems Associates, Inc. is currently offering the system at a cost of $10,000 to $18,500 depending on the terminal control modules required. Present operational terminal support includes the following IBM equipment: 2260 CRT, 1050 data communications terminal, and 7770 audio response.

The design of Time is such that modules to support additional terminal types can be easily added. Time is installed under the guidance of Shaw Systems personnel with the amount of support varying with the terminal modules desired.

Time is installed at the Bank of the Southwest in Houston, the Summit and Elizabeth Trust Co. in Summit, N.J., and the Memorial Baptist Hospital System in Houston.

Shaw Systems Associates, Inc. is at 2315 S.W. Freeway.

It can happen at any level of your data processing department. An operator is good enough to become a programmer. A programmer is good enough to move into systems analysis. But they lack the necessary training and education. So there they stay. Or there they go – to another company that will train them for bigger things.

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YOU CAN KEEP A GOOD MAN DOWN.

13 Attend Committee Meeting for Data Bank Study

(Continued from Page 1)

The advisory committee will not take an active part in the study, and will only meet twice more: once this fall and again in the spring of 1971. The actual work will be done by a small staff headed by Westin, professor of public law and government at Columbia University. Westin is the author of *Privacy and Freedom* and serves as a consultant to the New York State Identification and Intelligence System (Nysiis), the state criminal data bank.

Westin will be aided by two part-time research associates, two graduate student research assistants, two consultants, and a full-time administrative assistant.

Started Year Ago

Actually, the Westin study has been underway for a year. During that period, he said, they set up their staff, "developed basic theoretical approaches to data systems," compiled a list of data banks, and set up a classification system for data banks.

The study goes into full swing this summer, when Westin and several staff members will spend two months making on-site visits to data banks throughout the country. "We will try to talk to the managers and the technical experts," Westin said, "and we also hope to talk to the subjects of the data collections."

Westin also plans to circulate a questionnaire to a broad collection of government and private data banks. "The data banks know a great deal about us, but we don't know enough about them. No one today has systematic information on the numbers, types, and functions of computerized data banks that have been created; what measures have been installed in these systems to safeguard citizen rights; how effective these measures are; and how these computerized systems plan to expand," he declared.

Report Next Year

Westin's preliminary report will be submitted to the Computer Science and Engineering Board of the National Academy of Sciences in the spring of 1971. A revised monograph will be published early in 1972, according to Westin.

Westin said the report will contain a "broad philosophy" of data bank regulation, as well as a set "of very concrete proposals of what can be done."

Won't Suggest Best Law

But the report will not suggest a "best" law or a minimum program. Rather, it "will offer a wide range of choices" with a discussion of the legal, administrative, and technological implications of each, Westin explained.

Westin also noted that his John Hopkins Brookings Institute speech [CW, Jan. 21] was a "trial balloon" for many of the basic concepts underlying the study.

In particular, Westin said, "a major aspect of the study" will be the consideration of his proposed "writ of habeas data," first proposed in the Brookings speech. Just as a writ of habeas corpus requires the government to produce a person being held, the writ of habeas data would require "government and powerful private organizations to produce the data that they have collected and are using to make judgments about an individual," Westin explained.

Advisers Have No Power

The advisory board will be purely advisory – it will not take an active part in the study and will have no control of the final report. The advisory group will meet only twice more, and Westin himself has sole responsibility for writing and submitting the report.

But Westin denied suggestions that "big names" were selected solely to add prestige or legitimacy to his study. "They are not a blessing committee. We expect to gain very specific help from this group," Westin argued. "We made sure that all of the major viewpoints are reflected through outstanding people."

Westin noted that a broad range of interests was represented on the advisory panel, from strong privacy advocates such as Prof. Arthur Miller and Rep. Cornelius Gallagher (D–N.J.) to an advocate of the national data bank, Dr. Edgar Dunn.

Robert M. Fano, professor of engineering at MIT, is not a member of the advisory panel, contrary to earlier reports.

The study is sponsored by the National Academy of Sciences and funded for $149,500 by the Russell Sage Foundation.

If you fail this test, it doesn't mean you're not qualified to manage a data center. It just means the information has never been available to you before.

PERIPHERAL PERFORMANCE EVALUATION

1. For each of the following peripheral operations, enter the manufacturers rated speed, the present actual operating speed and calculate the variance (plus or minus):

Printer—space 1 delay, space 2 delay, space 3 delay, space 1 immed., space 2 immed.
Tapes—read/write, interrecord gap, low speed rewind.
Disk—read/write, average seek, max. seek, 1 Cyl. seek, rotation delay
Reader—read (cpm), read stack select (cpm)
Punch—punch (cpm), punch stack select (cpm)
Console—numeric (char/sec), alpha (char/sec), alphanumeric (char/sec), carriage return
CPU—base instruction execution time (microseconds)

2. Based on your specific configuration, estimate the average number of machine hours lost due to inefficient peripheral performance (as calculated above).

3. Estimate the cost per hour for your computer site. (Include machine rental, personnel, fixed overhead, maintenance costs, etc.)

4. Multiply the results of questions 2 and 3 to arrive at:

a. dollars spent for performance not delivered
b. cost of wasted machine time and manpower
c. EDP budget dollars which could be used more productively
d. cost of overtime production as a result of inefficient performance

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CPP to Picket GE, Honeywell

NEW YORK – Two computer companies will be the targets of picketing during the April 15 protest against the Vietnam war.

A coalition of professional groups, including Computer Professionals for Peace (CPP), will picket Honeywell and GE during the lunch period (noon to 1:30) and then join an antiwar rally at the United Nations.

The Honeywell office at 42nd St. and 2nd Ave. will be picketed because Honeywell makes anti-personnel bombs for use in Vietnam. According to CPP, Honeywell makes more money from weapons than from computers.

The GE office at Lexington Ave. and 51st St. will be picketed because GE is the second largest military contractor in the country, according to CPP.

Honeywell has been a target of CPP protests for over a year. CPP leaflets urge the public to boycott Honeywell products, including computers, to protest Honeywell's production of anti-personnel bombs. Anti-personnel bombs are specially designed to kill people without damaging property.

Computer Goes to the Dogs

ST. PETERSBURG, Fla. – Derby Lane is in the process of installing a computerized 'totalisator' system which will automatically register the number and amount of bets on each dog and will post the odds.

The St. Petersburg dog track is the first in the world to use this computerized posting system based on the system used in New York's big Aqueduct horse track.

The system was developed by Automatic Totalisators of Australia and is being installed through its U.S. branch, Automatic Totalisators of Wilmington, Del.

Concept and design

Gilbert F. Curtis

An honors graduate of Princeton, Gil Curtis is perhaps the industry's most skilled designer of generalized business software systems. Certainly Curtis-designed systems are operating very successfully in literally hundreds of major corporations throughout the U. S.

From this experience evolved the obvious need for a powerful report generator. One that would be easy to use, yet so powerful and fast it could be used as a report utility as well as for on-demand reports. In other words . . . CULPRIT.

Design and implementation

Anna Marie was literally a co-designer of CULPRIT and the major implementor. A skilled programmer, Anna Marie was able to perform basic CULPRIT functions in virtually I/O time, thus making CULPRIT unbelievably fast.

Anna Marie was at one time a member of the staff of Arthur D. Little, Inc., engaged in product development. Later, she spent a number of years in software design and development. Mrs. Thron holds a B.A. degree in chemistry from Beaver College, Pa.

Anna Marie Thron

Interface with data base language

James J. Baker

Jim Baker is an M.I.T. graduate (math major and honor society member) who has completed requirements for his Phd at Harvard.

Prior to joining Cullinane Corporation, Jim spent 5 years in advanced software system development at I.B.M. Therefore, Jim was the logical choice to develop the IMS/data language 1 interface module . . . which allowed CULPRIT to enhance the report generator capability of DL 1.

Jim was also a major contributor to the OS version of CULPRIT.

Documentation

An engineer with a B.S. in E.E. from Michigan State, Ken spent many years in electronics research and software review and evaluation before joining Cullinane Corporation.

He authors a monthly column on software for Modern Data magazine and knows exactly what the user looks for in terms of really effective documentation.

So when Ken wrote the user's manual for CULPRIT he put himself entirely in the user's position. Example: he devoted a major effort to a self-teaching section for junior level personnel . . . but at the same time included substantial material for the advanced CULPRIT user.

Kenneth Falor

Meet the people behind the most important software package of 1970: new CULPRIT.

Before many months are out the chances are you'll be using CULPRIT. Wherever it has been shown it has generated intense interest. The list of sales is growing quite rapidly. And it is the type of package literally *everyone* needs.

So we thought you'd like to meet a few of the more important people behind it. There are others. Perhaps a dozen Cullinane staff members had some part in CULPRIT. But these are the four who deserve the credit.

CULPRIT brought us a few surprises. Particularly in speed. While we designed it for flexibility and ease in use CULPRIT turned out to be much faster than our most optimistic estimates. Otherwise it performs exactly as planned.

And what we planned was an easy-to-use report generator and information retrieval system that would allow you to respond to on-demand report requests regardless of report complexity. One that was so efficient it could be used as the report utility in production systems.

How CULPRIT differs

Many report generators can produce only one report from one pass of the data file. Others produce a Cobol program which must be compiled, link edited and run before they produce a report. Some even have both problems. That's Model T designing!

CULPRIT is a parameter-driven program. No compiling needed. The program is kept on the core image library like a utility and produces a report as directed by the parameter coding. Highly efficient, it produces many reports (up to 99) with a single pass and can extract from multiple input files.

CULPRIT requires from 1/10 to 1/40 the normal coding time. This means that the most junior-level programmer can request and get a simple one-time report in minutes. Or many complex reports in one pass . . . with just a few hours of coding. Not weeks. Hours! But fast reports are not all that CULPRIT can do for you.

New Systems

When you design a new system, how much of it is made up of report editing programs? Half? A third? Then you can put your new system on the air nearly one-third to one-half sooner by simply plugging new CULPRIT into the system to handle the reporting requirements. You not only save programming time, but the machine time usually needed for debugging this part of the system.

Processing speeds are close to those for well-designed and laboriously hand-coded programs. Remember . . . this isn't an ordinary report generator. You just load and go.

Features

CULPRIT has multi-line output for address labels, notices, etc. Other options include header variables; multiple-lines in headers, detail and totals; separately specifiable total lines; calculation ability on both detail and total levels; use of memonics for working fields; and many others. Output may be printer, punched cards, tape or disk . . . permitting program and test file creation and conversion.

Find out for yourself!

Send for a complete 15 page technical report. Or, if you'd rather discuss CULPRIT directly with one of the above people (or equally well-qualified Cullinane staff members), pick up your phone and dial (617) 742-8656. You really ought to know about CULPRIT. Don't pass up the chance!

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60 State St., Boston, Mass. 02109 Phone: (617) 742-8656. Other offices in New York, St. Louis, and London.

Editorials

There Must Be a Better Way!

Why, after nearly 15 years of talk and study, hasn't the computer industry managed to find a way around the problems of going from one language to another, or one version of a language to another?

Today, there are a few very clumsy translators between one particular language and another. Human intervention is still required, even for the best of translators. Time and money are invested in programming, reprogramming, and then testing new versions.

Standardization is no answer. A standard language simply builds walls around what a user can do in a given version of a given language. Standardization does nothing to help a user work with several languages together.

The computer itself seems to be the only plausible tool for assisting in language conversions. It should be possible for any user to establish a single language standard for his entire installation. The only remaining need for separation comes between the scientific and the business-oriented languages, because languages should be oriented to basic needs.

The user ought to be able to simply take a program in any language, run it through a master program generator, and produce a workable, debugged program in another language. The tool is available – the computer.

The Word Game

The Army's recent action in "destroying" its computerized data banks on lawful civilian political activity was more a matter of semantics than of destruction.

Although the tapes have been erased, the data banks still exist in written form, and even possibly in punched card form. And presumably the programs for file maintenance and retrieval still exist.

Which all means the computerized data banks could be recreated in days, if not in hours.

Further clouding the issue is the fact that the Army apparently distinguishes between "computerized" and "computer-aided." So the "destruction" order did not apply to computer-maintained indexes to manually maintained data banks.

All this "destruction" of computerized data banks has only been a maneuver to take the pressure off the Army and to lead critics away from the real question:

Why is the Army maintaining files on civilian activity?

Civilian activity is a question of internal security, and as such, should be handled by the FBI or possibly the Secret Service – if it's necessary at all.

Sen. Sam J. Ervin (D-N.C.), normally considered quite conservative, summed up the situation this way: "I suggest the Army . . . re-identify the enemy. Under our Constitution, that enemy is not the American citizen."

Is He Really That Good?

Letters to the Editor

People Must 'Work for Change Within the Imperfect System'

Re Stan Myers' letter in your March 4 issue, which was in response to my letter in your Feb. 18 issue, I said nothing to indicate that any of us, including programmers and systems analysts, should stand idly by while any such thing as Nazi Germany's "final solution" is worked out. I just do not happen to see anything very noble about erasing tapes, or destroying computers because you do not agree with the product the owner produces, be it napalm, or military aircraft, or French bidets.

Nor do I believe that owners have "superior insight," or that "lowly programmers and analysts" have a lesser insight. I just do not believe that programmers and analysts have license to destroy because what they destroy is the tool with which they work.

There are many wrongs that I see and Mr. Myers might agree with me on most of them. For my part, I am going to be very reluctant to adopt the evangelistic fervor Mr. Myers advocates. If his methods succeed, then either we will wind up in a dictatorship run by people like Mr. Myers, or we will be citizens in the democracy that follows the revolution and I suggest such a democracy will be but little changed from the present one, since the same majority will prevail.

I can only hope that the vast majority of us will work for change within the imperfect system, which has served us so well for nearly two centuries.

David W. Chaffin
President

Applied Data Processing
New Haven, Conn.

'Human Error' as Inaccurate A Phrase as 'Computer Error'

Interface errors are the discrepancies between human logics (sic) and electro-mechanical logic.

The property of organic matter, and of living organisms, is to make mistakes and then to correct them. The property of complex, yes-no, electro-mechanical devices is to function "perfectly" – or to malfunction in some gross manner, and incorrigibly.

Through the use of computers, man may now make errors on a scale hitherto uncommon. The errors are not of the kind a human would ordinarily make alone; yet the machine has followed orders precisely. Thus the error has occurred not in the man nor in the machine, but in their interface. "Human error" is no more accurate a phrase than "computer error."

Peter Dvorak

Portland, Ore.

Significant Problems Omitted in Micr Article

In your Feb. 25 issue you ran a short article on Micr devices.

The points covered in the article were valid, but I felt that two significant problems were omitted.

First, IBM users have no high-level language capability with sorters. I can't say what the situation is for other hardware. If support were added to Cobol and PL/1, many banks would be more interested in these languages.

Second, no one has yet delivered a machine with the capability of microfilming documents as they are read. If this problem can be solved, it will improve both work flow and control.

Allen Tyler
Systems Analyst

Austin National Bank
Austin, Texas

Summary Report Published On University Unbundling

In reference to the article "Universities Seek Unbundling Answer" which appeared in the March 4 issue, the last paragraph mentioned that a report will be published summarizing the suggestions and positions taken at the different sessions. Would you kindly inform me as to how I might obtain a copy of same?

David R. Smail

Arthur Andersen & Co.
Cleveland, Ohio

Contact Dr. E.P. Miles, Computing Center, Florida State University, Tallahassee, Fla. 32306. Ed.

APL-Manhattan's APL Not a Condensed Version

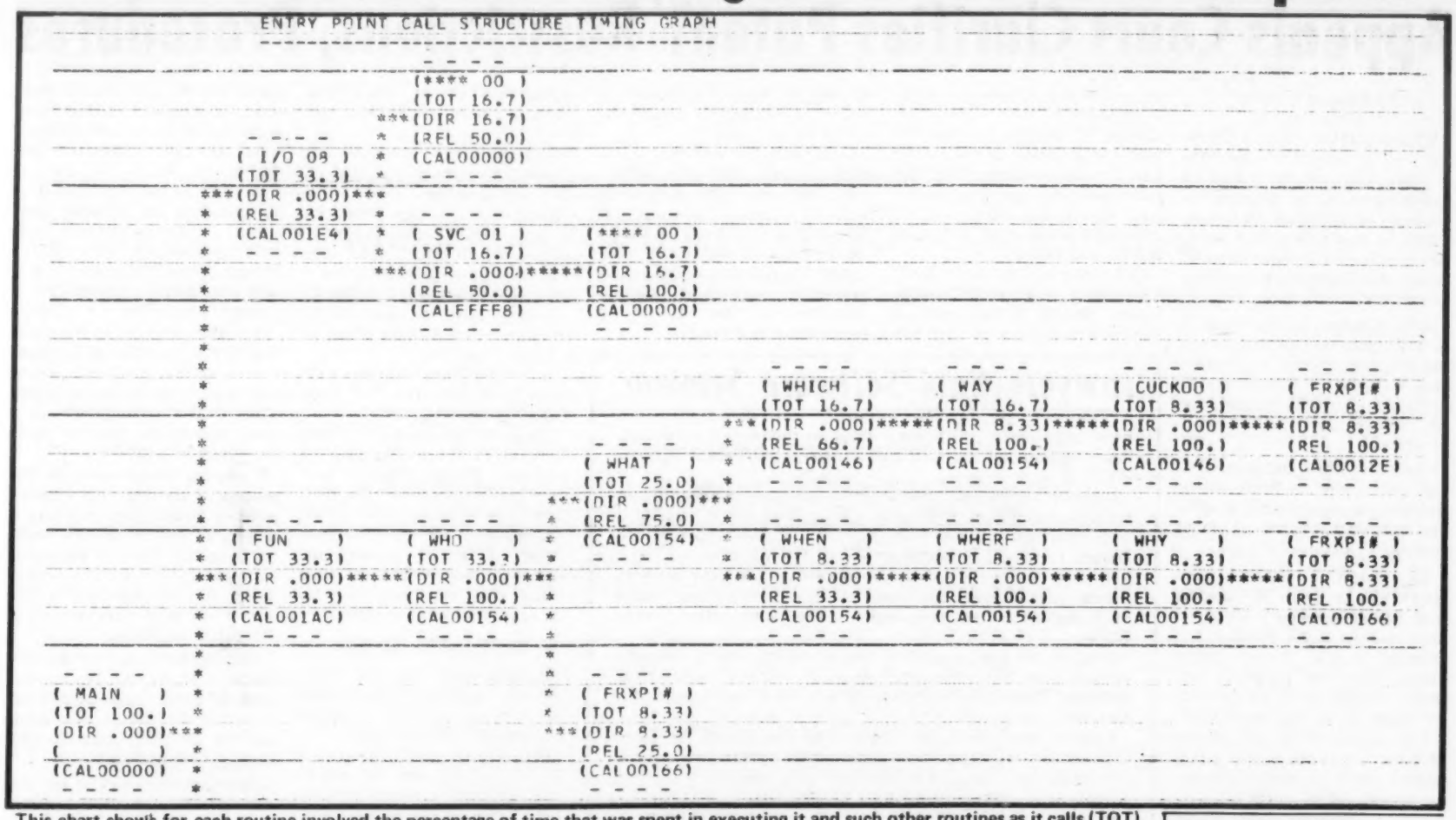
We made an error in supplying information to *Computerworld* for the March 11 issue. Industrial Computer Systems, Inc. Mini-Manual is "A Condensed Introduction to APL."

Our APL service is "standard IBM 360," not a condensed version.

Joel J. Weisenfeld
Director of Marketing

APL – Manhattan
New York

After Measurement—Management Action Is Required


ENTRY POINT CALL STRUCTURE TIMING GRAPH
(**** 00)
(TOT 16.7)
***(DIR 16.7)
* (REL 50.0)
(I/O 08) * (CAL00000)
(TOT 33.3) *
(DIR .000)
* (REL 33.3) *
* (CAL001E4) * (SVC 01) (**** 00)
* * (TOT 16.7) (TOT 16.7)
* ***(DIR .000)*****(DIR 16.7)
* (REL 50.0) (REL 100.)
* (CALFFFF8) (CAL00000)
(WHICH) (WAY) (CUCKOO) (FRXPI#)
(TOT 16.7) (TOT 16.7) (TOT 8.33) (TOT 8.33)
(DIR .000)**(DIR 8.33)*****(DIR .000)*****(DIR 8.33)
* (REL 66.7) (REL 100.) (REL 100.) (REL 100.)
(WHAT) * (CAL00146) (CAL00154) (CAL00146) (CAL0012E)
(TOT 25.0) *
(DIR .000)
(FUN) (WHO) * (REL 75.0) *
(TOT 33.3) (TOT 33.3) * (CAL00154) * (WHEN) (WHERE) (WHY) (FRXPI#)
(DIR .000)**(DIR .000)*** * (TOT 8.33) (TOT 8.33) (TOT 8.33) (TOT 8.33)
* (REL 33.3) (REL 100.) * ***(DIR .000)*****(DIR .000)*****(DIR .000)*****(DIR 8.33)
* (CAL001AC) (CAL00154) * (REL 33.3) (REL 100.) (REL 100.) (REL 100.)
* * (CAL00154) (CAL00154) (CAL00154) (CAL00166)
*
*
(MAIN) * (FRXPI#)
(TOT 100.) * (TOT 8.33)
(DIR .000)*** ***(DIR 8.33)
( ) * (REL 25.0)
(CAL00000) * (CAL00166)

This chart shows for each routine involved the percentage of time that was spent in executing it and such other routines as it calls (TOT), and also just how much time was spent in executing itself alone (DIR). In the illustration it appears that appreciable time was only spent in three out of the routines through I/O and FUN, (** 00, WAY, FRXPI#,). This type of analysis helps display quickly the actual symptoms of some important types of performance failures.**

Measurement, as we have commented, is beginning to give results. But measurement itself is not a profitable operation. You can measure anything you like – but that doesn't change it. You can find that a computer program is not particularly efficient, and yet, knowing this won't change it or make it more efficient. In these days of high programming costs the arguments are often in favor of just continuing to run the program, rather than reprogram it.

The Taylor Report

by Alan Taylor

The creation of effective action from measurement is a subject in itself. It has been neglected in the past and only now is beginning to receive some of the attention it deserves. However, there is a long way to go yet, before it receives the full amount of attention it deserves.

First – Down With Print-Outs!

In the first place, for measurement to be useful, after it has been made, it is necessary for it to be presented in some reasonably accessible and meaningful form. Large computer print-outs supplied by most measurement systems are not particularly recommended for this, but in some of the available systems you will find single page print-outs which can be extremely useful. Figure 1, for instance, taken from Lambda's Corporation Leap analysis shows one such page. It gives details of the amount of time that occurs in each of a number of routines, and how they are related to each other. It is one of the best ways that I have seen such information presented.

At least this shows a quick way of bringing the results of the measurement up to the top of consciousness so that they can be reviewed. This is one of the first steps necessary after measurement if improved programming efficiency is to be achieved.

But That's Only the First Step

Bringing the key elements into conscious operation, however, is still only part of the game. It is still necessary to do something about it. Indeed, it can be said that putting inefficiencies into a conscious state, and then doing nothing about obtaining the answers is simply having the worst of both worlds. It just makes everyone uncomfortable and morale is inclined to slump.

Fingerprinting Inefficiency

But, factually, it turns out that there are a number of things which can be done. Once the type of inefficiency is known, it becomes possible to look for particular solutions. An interesting one that I found recently involved what to do when the central processor was working hard, while everything else sat idle. This is a comparatively unusual situation (normally CPUs are working in the 30 to 40% area) but it is sometimes inclined to occur where high-level languages like Cobol and Fortran are used. In this case, the solution involved was to remove the non-branching sections from a Fortran program which used about 20 Fortran-computed statements, and replacing them with another, but cleaner expression.

. . . Leads to Tailored Solutions

To do this, all that the improver had to be given were the details of the range of data which would occur, and the accuracy needed both in the data and the required result. With these in hand it was simple to produce a series of continued factions which produced the same result but with a much reduced usage of central processor time.

This, then, is what is needed after measurement. First to highlight the results of the measurement, and then to find a tailored solution to the problems posed. With these being specifically sought for, quite surprising results can be obtained.

Also Action!

But these results can only be obtained if the solutions are acted upon. A computer installation will therefore require management action; action to obtain solutions; action to budget the expense of implementations of solutions once they are obtained. All this before a cent of profit is available from measurement. So do not forget to add Action to the prerequisites to improvements through measurement.

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Lawyers Update Software Scene

Appeals Court Clarifies Patent Restrictions, Procedures

By Edward J. Bride
CW Staff Writer

WASHINGTON, D.C. – Carrying out an inventor's machine process, whether by wiring or programming a computer, amounts to infringing his patent.

This is how one patent attorney explained the significance of recent developments in program protection.

Atty. Gordon Sanborn said it is the machine processes, not the programs, which are patentable, even though these machine processes may only be performed through use of a computer program.

Court decisions and patent office philosophy are being widely discussed in legal circles, despite the relative absence of news coverage of two recent cases.

The latest decision handed down by the Court of Customs and Patent Appelas (CCPA), in the case of *John P. Mahony*, reversed a U.S. Patent Office ruling that the technical language used in the claim prevented approval of the application.

The ruling [CW, March 4] stresses patent office policy that claims must be understandable to persons skilled in the art.

Last November, the CCPA ruled on the *Bernhart-Fetter* appeal, reversing another patent office ruling that would have excluded programmable processes from the category of patentable inventions.

The Mahony Decision

A prominent patent attorney close to software issues said that the Mahony decision "rebuts the patent office position that any word that can be distorted to cover pencil and paper makes the claim bad."

In other words, technical definitions for words like "bit" and "bit stream," as well as processes like "compare," "shift," and "synchronize" are now acceptable in context, even though they may have lay meanings.

The patent office has accepted technical definitions for applications in other disciplines, but computer experts contend that the office had not done so within their field.

Irving W. Kayton, professor of Law and director of the Patent Law Program at George Washington University, has written several papers discussing the significance of most of the software patent cases.

As Kayton sees it, the Mahony application deals with "sophisticated digital hardware for a communications network," to perform processes which could also be accomplished by a programmed digital computer.

From the Mahony Attorneys

The lawyers who obtained the Mahony decision were Howard R. Popper and J.W. Falk of Bell Laboratories, in Murray Hill, N.J.

Popper spoke about the decision this way: "Claims can now be written in language the engineers and program designers themselves employ, instead of in a language that some theoretical perfectionist at the patent office decreed."

The trouble was, Popper said, "the patent office never told us what language they would find acceptable. They just refused to accept any method claim language we proposed."

Comparing the decision in the Mahony case with the CCPA's opinion in *Prater-Wei*, Falk said: "In Prater, the court was faced with deciding whether a method of operating upon simultaneous equations could be described as a claim without any mention that the method was being done by a machine."

The court said "no" to that, because, historically, "mathematical operations could be done with pencil and paper," Falk said.

Mahony's process, however, was different, because a bit stream, as every engineer knows, cannot be synchronized by mental computation.

A Scholar's Viewpoint

Kayton, who is also director of the Computers-in-Law Institute at the George Washington University Law Center, said that *Bernhart-Fetter* is a "monumental case," while *Mahony* is another step in the same direction.

Bernhart-Fetter and *Prater-Wei* both are apparatus-and-method claims; the patent office says you can't have one without the other.

Mahony is not a sudden departure, except in the area of technical language.

Bernhart-Fetter is a milestone because it achieved what *Prater-Wei* was trying to . . . and that was to obtain protection for a process *which might be able to be done mentally, but* which principally was accomplished on a digital computer.

In neither case was the software itself patented, but only the programmed process.

The press has apparently been ignorant of the *Bernhart-Fetter* decision, which covers a programmable procedure for plotting a three-dimensional figure.

It involves the use of a computer program to analyze and compute the geometrical positions, plus equations to relay those positions to the plotter.

No Mental Process Rule

Sanborn said that the CCPA still has not had the opportunity to rule on whether a mental process could be patented.

He said that, in *Prater-Wei*, the attorneys said they did not intend to claim a mental process, but that their claims were written so broadly that they had.

The CCPA then agreed with the patent office that the *Prater-Wei* application overclaimed the invention, but that, if the claim were resubmitted to encompass only the machine process, then it would be granted.

The *Prater-Wei* application has not been resubmitted.

Bernhart-Fetter, according to Sanborn, is a "clarification of *Prater-Wei* by the court."

Here the court ruled that the step of programming a computer to perform a process *which might also be performed mentally* was indeed patentable.

In neither case did an applicant claim to be the inventor of a mental process, as was true also of the *Mahony* case.

Hardware Does the Work

Sanborn emphasized that programs do not perform the processes in question. The hardware performs the work, and the processes are the subject of the patent.

The important point is that programmers are afforded protection, under patent law, for certain aspects of their efforts, namely when these efforts are used to prepare (program) a computer to perform a process.

One observer likened the situation to the invention of a doughnut machine. A person might have had a patent on a machine which laid the dough around a small center-pole, then dropped the dough into the fryer.

If another person invented the process of starting with a round piece of dough, then punching a hole in it, this new process could be patented, but the apparatus to perform the process would need to be discussed ("disclosed" in legal terminology) in the patent application.

The apparatus, and the process, could both be the proper subjects of patent applications, but a patent for the process could not be obtained without "disclosing an apparatus."

Applying the cases to the current situation, Kayton said that the *Prater-Wei* application was for an analog device, designed specifically for the process, and the process could be implemented on a digital computer.

He said there is a question as to whether such a patent, on the analog device, would be infringed if the process were carried out on a digital computer.

He also said that the Mahony process claims could be infringed if the process were carried out on *any* device. Not the hardware claim – the "apparatus" which was disclosed to carry out the process – but the process claim itself.

Sanborn agreed that an inventor's work is "now under statutory protection . . . No matter how you carry out the process, if you wire or program a computer, if you're carrying out the [machine] process, you're infringing" the patent.

Lawyers Hold Software Seminar

The story of software protection gets deeper, but not necessarily clearer, with each decision rendered by the U.S. Patent Office or the Court of Customs and Patent Appeals (CCPA).

A group of lawyers interested in software protection has formed the Patent Resources Group, and has scheduled a workshop and lecture series for the last two weeks, at the Dorado Hilton Hotel in Dorado Beach, Puerto Rico.

Among the topics scheduled for discussion were developments in *Prater-Wei* and *Bernhart-Fetter*, plus other recent decisions and current philosophy of the patent office and the CCPA.

One of the background papers was Prof. Irving Kayton's presentation from the 1968 Law of Software conference, entitled "Patent Protectability of Software: Background and Current Law."

Kayton, director of the Patent Resources Group, indicated that another topic was the necessity of new patent law.

Pointing out that the law had not changed since the invention of digital computers, Kayton said that computers had nonetheless increased the field of patentable processes.

The *Mahony* decision was not handed down in time for inclusion into the program, but the various aspects were to be discussed in relation to the other two precedents.

Much of the legally oriented discussion will remain academic, until the principles discussed have been tested in the courts.

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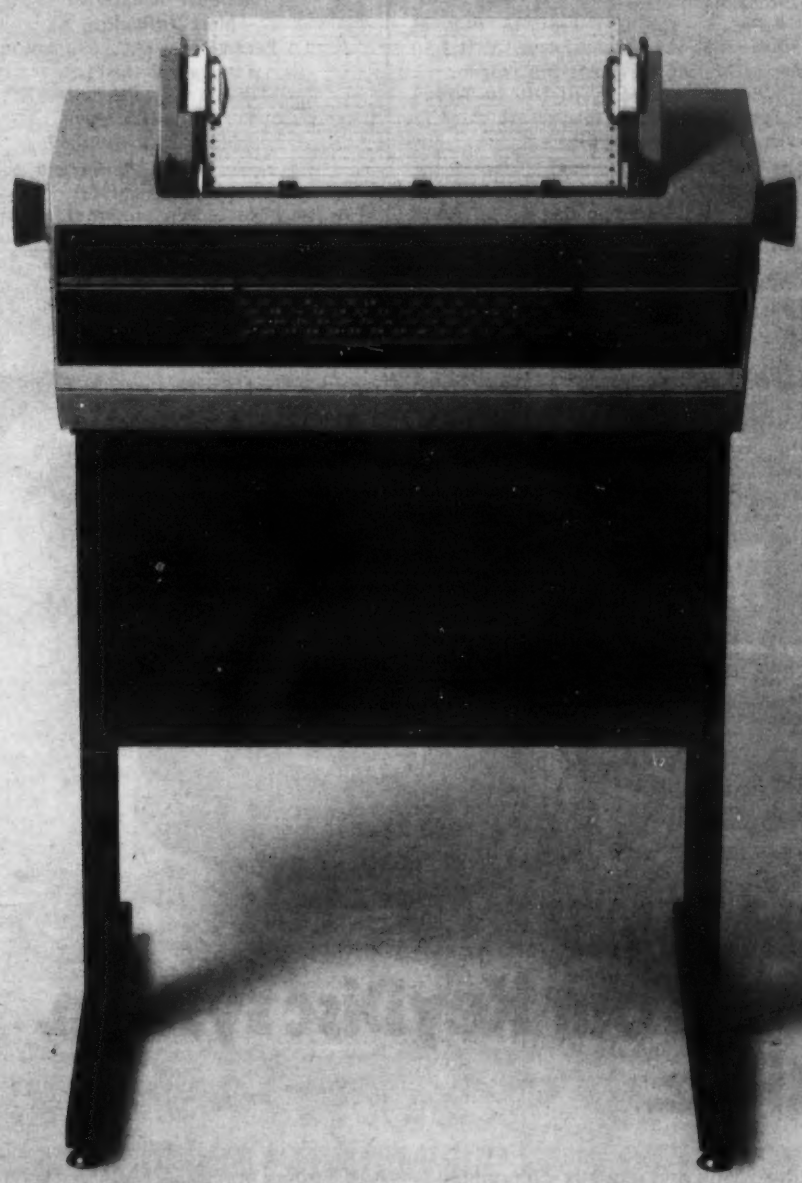

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Computer Picks 18 Toughest Tournament Course Holes

ARMONK, N.Y. – A computer that has compiled data during three seasons on the PGA tour has analyzed how the tournament golf courses played in 1969.

Programmers asked the following questions:

- What were the toughest par 3-4-5 holes?
- The most difficult courses?
- The number one eagle hole?
- Are courses yielding lower scores each year?

The answers come from recorded data on more than 2.5-million shots taken on 810 different golf holes – better than half of the holes played on the 1967-69 PGA tours.

IBM's touring 1130 has also selected last year's 18 most difficult holes, based on player performance at 23 courses.

Taken together, those holes form a par-72 "monster" that runs 7,655 yards in length. Grouping the scores of the touring professionals together on this impossible collection of holes, taken from golf courses that extend across the country from La Jolla, Calif., to Sutton, Mass., produced a 78.14 average.

Toughest Holes

The most difficult hole yet recorded by the computer was the par-4 18th at Doral Country Club, Miami, during the 1968 Doral Open. Players averaged 4.66 on it – higher than professional golfers average on par 5s.

The most difficult par 3-4-5 holes in 1969 were:

- Par 3 – the 235-yard 4th hole at Whitemarsh C.C., which played to a 3.50 average during the Philadelphia Open.
- Par 4 – the 461-yard 10th at Torrey Pines G.C., which played to a 4.57 average in the Andy Williams Open.
- Par 5 – the 539-yard 13th at the Country Club of Miami, which played to a 5.13 average during the National Airlines Open.

Most Difficult Courses in '69

	Field Average	Strokes Over Par
1.) Champions C.C., Houston, U.S. Open	74.7	4.7
2.) Preston Trail G.C., Byron Nelson Open	73.6	3.6
3.) Torrey Pines G.C., Andy Williams Open	74.8	2.8
4.) Firestone C.C., Akron, Ohio, American Golf Classic	72.4	2.4
5.) Colonial C.C., Colonial National Invitational	72.8	2.8
Most Difficult in '68		
1.) Pecan Valley C.C., San Antonio, Tex., site of the PGA	74.99	4.9
2.) Oak Hill C.C., Rochester, N.Y., site of the U.S. Open	74.5	4.5
Most Difficult in '67		
1.) Baltusrol G.C., Springfield, N.J. site of the U.S. Open	74.3	4.3
2.) Firestone C.C., Akron, Ohio	73.5	3.5

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earned the most difficult par-3 rating twice, first in 1967 when it played to a 3.52 average.

The most difficult par 5, 1967 through 1969, was the 580-yard 15th at St. Georges C.C., which played to a 5.27 average during the 1968 Canadian Open.

Toughest Eighteen in 1969

Arbitrarily looking for four par 3s, four par 5s and 10 par 4s, the computer sorted through some 414 holes, on which it had scoring data, for the most difficult. Those picked were the 18 that professional golfers had the most trouble with.

Par 3s

1.) The 235-yard 4th hole at Whitemarsh Valley C.C., Philadelphia, Pa., which played to a 3.5 average.

2.) The 238-yard 8th hole at Preston Trail G.C., Dallas, Texas, which played to a 3.43 average.

3.) The 205-yard 13th hole at North Shore C.C., Milwaukee, Wisc., which played to a 3.39 average.

4.) The 230-yard 14th hole at Sahara C.C., Las Vegas, Nev., which played to a 3.38 average.

Par 5s

1.) The 539-year 13th hole at the Country Club of Miami, Fla., which played to a 5.13 average.

2.) The 566-yard 1st hole at Warwick Hill, Flint, Mich., which played to a 5.10 average.

3.) The 609-yard 11th hole at Colonial C.C., Ft. Worth, Tex., which played to a 5.08 average.

4.) The 520-yard 11th hole at Whitemarsh Valley C.C., which played to a 5.05 average.

Par 4s

1.) The 461-yard 10th hole at Torrey Pines G.C., La Jolla, Calif., which played to a 4.57 average.

2.) The 428-yard 16th hole at Preston Trail G.C., which played to a 4.45 average.

3.) The 456-yard 15th hole at Warwick Hills, which played to a 4.45 average.

4.) The 466-yard 5th hole at Colonial C.C., which played to a 4.41 average.

5.) The 437-yard 18th hole at Doral C.C., Miami, Fla., which played to a 4.4 average.

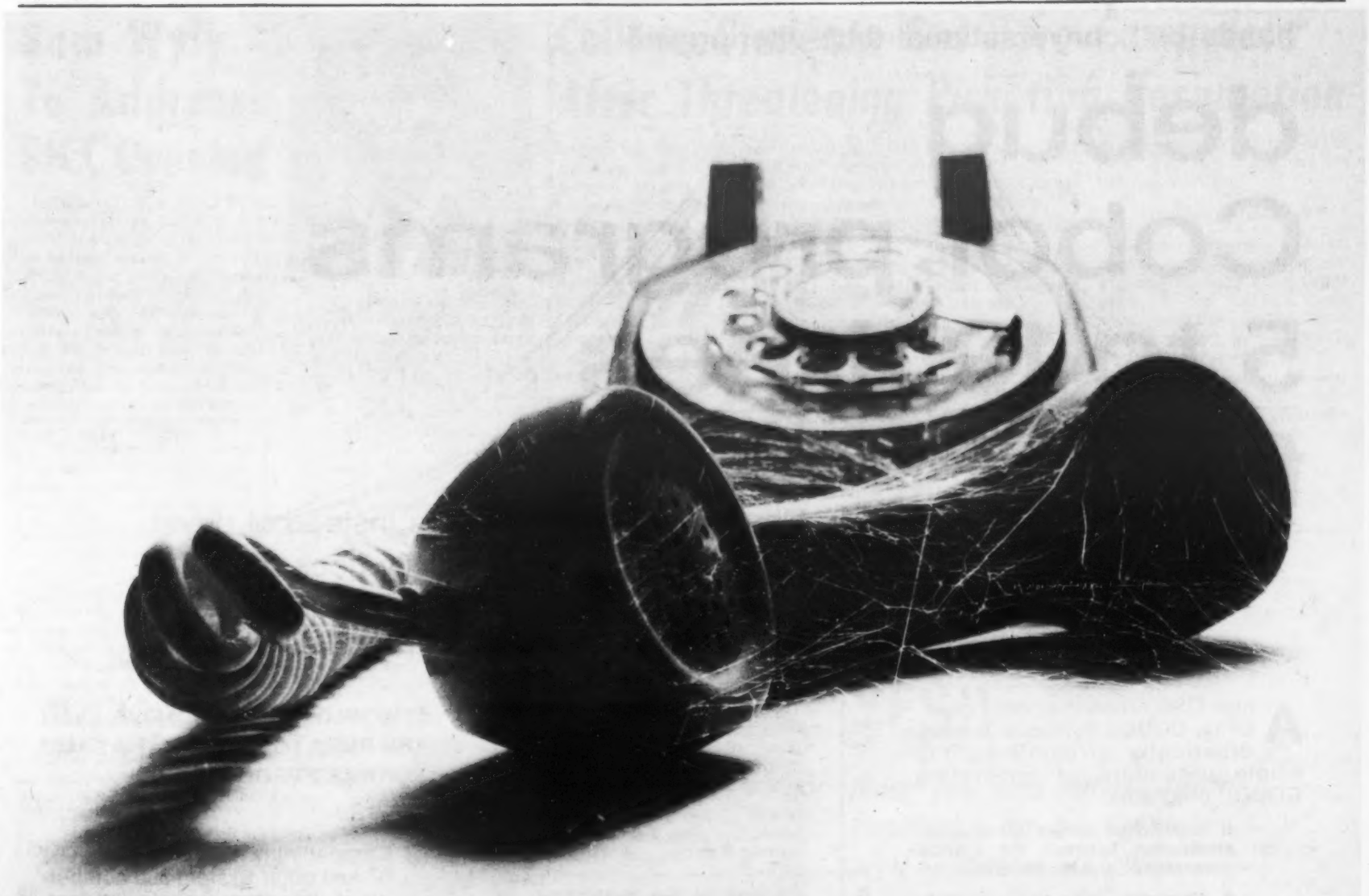
6.) The 450-yard 4th hole at Pleasant Valley C.C., Sutton, Mass., which played to a 4.4 average.

7.) The 449-yard 11th hole at Rancho Municipal G.C., Los Angeles, Calif., which played to a 4.38 average.

8.) The 452-yard 10th hole at Atlanta, C.C., Atlanta, Ga., which played to a 4.35 average.

9.) The 454-yard 15th hole at Westchester C.C., which played to a 4.34 average.

10.) The 460-yard 12th hole at North Shore C.C., Milwaukee, Wisc., which played to a 4.33 average.



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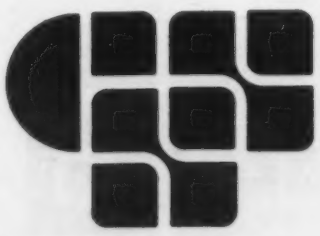

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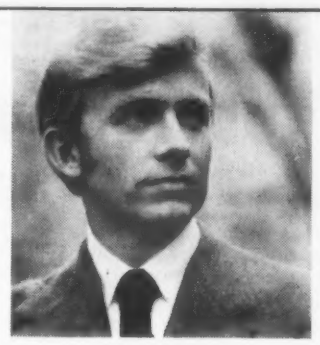
Sam Wyly To Address SJCC Opening

NEW YORK – Sam Wyly, chairman of the board, University Computing Co. (UCC), will be keynote speaker of the 1970 Spring Joint Computer Conference in Atlantic City, May 5-7.

Wyly, who will address the opening session in Convention Hall, will describe how "the marriage of computers and communication is bringing instant computer power to every corner of the world." He is expected to explain how "the new possibilities for making computer power available everywhere will revolutionize our concepts of doing business on a world scale, including production, distribution and business services."

Out of Joint

The preregistration deadline for the Spring Joint Computer Conference is April 15, not May 15 as reported in CW last week.



Sam Wyly

A pioneer in the development of multinational computer utility concepts and facilities, Wyly founded University Computer Co. in 1963, at the age of 28. Today UCC has nearly 5,000 employees, revenues in the range of $110 million, and a net worth of over $80 million.

A native of Lake Providence, La., Wyly is a graduate of Louisiana Polytechnic Institute and University of Michigan's Business School. He founded UCC following a successful sales career with IBM's Service Bureau Corp. and Honeywell's EDP department.

College Students Get Two Computers After Threatening Picketing Resumption

DENVER, Colo. – Students at the Community College (CCD) here are jubilant over their acquisition of an NCR Century 200, only weeks after the new state administrator promised to give Colorado's computer acquisition problems his "highest priority."

Bernard E. Teets, new commissioner of administration, said that Metropolitan State College's order for an CDS Sigma 5 has also been approved.

Teets succeeded Dr. E.W. Sandberg, who resigned in February to join a hospital-oriented service bureau.

Sandberg had been criticized for allegedly allowing pro-IBM sentiment to influence state computer orders [CW, Sept. 17, 1969], and for allegedly delaying computer approvals for junior colleges [CW, Dec. 17, 1969].

Students picketed state offices here last November, charging that pro-IBM bias was causing the delay in approval of their order.

Student representative James Cokas, a data processing major in his second year at CCD, wrote to Teets last month, threatening resumption of picketing in two weeks if a computer order had not been approved by that time.

Two weeks later, to the day, Teets announced selection of the NCR and XDS computers for the junior colleges.

Delivery in 10 Days

The two companies were apparently confident that the considerable publicity given to the plight of the students would bring favorable results. Both computers were delivered within 10 days of the order.

A major concern of the students was that they might graduate from their data processing classes without "hands-on" experience.

They were sharing time on a nearby hospital computer as an interim measure.

Legislator Asks Management Plan For Research

WASHINGTON, D.C. – The creation of a government-wide management system to oversee governmental research and development efforts was proposed last week by Congressman Emilio Q. Daddario (D-Conn.).

"No one," he said, "in the federal government knows what is going on right now. The information systems which we presently use in research management may be excellent repositories for historical information, but they have not been as useful as they should be in furnishing information for present policy decisions."

Daddario, who is chairman of the House Science, Research and Development Subcommittee, told the first Information Industry Association meeting here: "We must develop a new management system to effectively channel our research and development efforts into those activities generated by the problems and challenges facing our society."

Daddario cited Congress's problems in deciding which government research programs should be funded in 1970 without any accurate information on the status of programs undertaken in the past year.

"The basic ingredient for an effective and more efficient management of our scientific research and development is an information system which can furnish on a real-time basis that data basic to the decision-making process," Daddario concluded.

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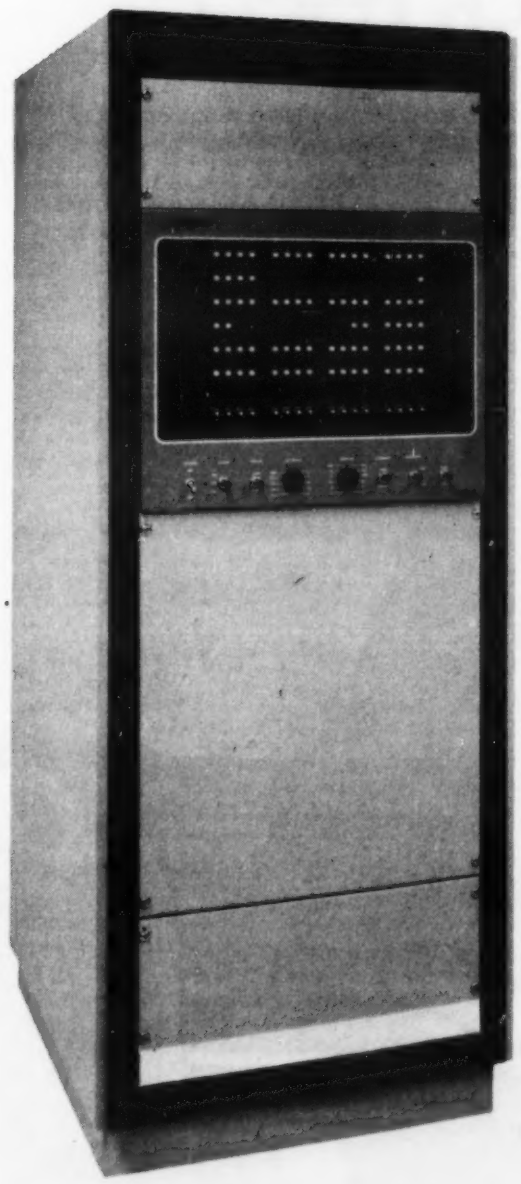

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Application:

The Changing Systems Engineer – Part I

Who Is He? What Is His Role in a Competitive Society?

By M.L. Stiefel
Special to Computerworld

Before 1970, the SE (or, as CDC calls him, the professional analyst) was wrapped in the loveliest of packages. He was bright, energetic, highly educated, personable, *free*. You want a system design? Ask the SE. He'll design it for you. Maybe he'll even manage to uncover a higher level of complexity than you expected in your problem, so you'll be able to justify a bigger machine.

You want a new application? He'll give one of the company's standard packages that you can "easily" adapt to your needs.

You want your package to work? He'll help you modify it. If you ask nicely, he'll do these things all by himself, if you're short of people.

You want some new procedures? He'll help you write them. You want your system to work? He'll diagnose the problem and help you solve it.

> Systems engineers representing computer manufacturers once appeared in users' offices with monotonous regularity, but now their existence is threatened. Users are seen making more selective use of SEs since they now have to pay for their services, from IBM and CDC, for rates ranging from $22 to $60 per hour. The users are likely to benefit, in the long run, because the manufacturers will have to maintain competitive levels of competence in their system engineering organizations.

That was Before. Now, though, this eager young man is regarded in a different manner. The package is gone. The tinsel and the pretty ribbon have disappeared. The same SE suddenly finds himself subject to criticism. He is termed immature, undereducated, and incompetent.

The turnabout has come because now the user must pay. Simply stated, the SE finds it difficult to compete, on the average, with consulting talents offered by other companies in the field.

A systems engineer is a consultant, in the strongest sense of the word. He is expected to render professional advice and assistance to users.

Unfortunately, the people selected for the task by computer manufacturers are not always as well equipped technologically as they need to be. The policies of the past, where a share of SEs were trainees, are inadequate when consulting companies with more experienced staffs used to fighting for every dollar earned proliferate in every corner of the country.

What should a systems engineer be capable of doing?

He should be an analyst – one who can observe an existing system in operation, and then break down the system into its component parts on paper for the user. Each part must be defined in sufficient detail so that it can be completely understood. The systems engineer should be able to identify problems associated with the existing system, so that solutions may be sought.

He should be able to conduct trade-off studies (sometimes called feasibility studies) to determine the most cost-effective approach to solving a given problem.

Notice that this generally won't be done by computer manufacturers' SEs, because the user will have already bought (or rented) a set of hardware and software by the time he encounters the SE. If the user wants to expand his operation, then the SE must be able to do the trade-off studies for him.

SE Is Not Objective

The user must remember, though, that the SE is unlikely to consider the feasibility of solutions that don't involve his employer's equipment.

The SE must be able to produce system designs which consist of something more substantial than three pages of myriad geometric shapes, all joined by lines that end in neat arrowheads and that are labeled "Yes" and "No."

A complete system design specification contains: a statement of functions to be performed; complete definition of the equipment configuration; computer input formats and output formats, including start and end of message sequences, field separators, and legal ranges of values for each field; the data base, including the structure and location of every file and the definition of every field, including legal ranges of values; and the transition function or transfer function, which specifies the precise relationship among all the inputs, all the outputs, and the data base.

What Outputs

The transfer function shows, for every legal or illegal input, how the data base will change and which outputs will be generated in response to the input.

The systems engineer must be able to write system design specifications very well.

The SE must understand the principles of computer programming, although he need not necessarily be a programmer himself. He must know enough to recognize errors in other people's programs, and to supervise program design.

The SE must be intimately acquainted with his company's hardware. He must know its idiosyncrasies. He must be able to diagnose, from intuition, printouts, intelligence, and experience, with the aid of diagnostic tools supplies by the company, the source and nature of errors that arise in system operation.

To do this effectively, the SE must be expert in system testing, so that he can use the tools efficiently, and isolate faults in short order or quickly determine that a system is working properly if that is the case.

He should appreciate the techniques of evaluation, of measuring system performance against objective criteria established by the user, so the user can judge whether or not he's getting his money's worth.

Finally, the SE should be crazy about documentation, so that he can give the user a clear, concise statement of what has been done or of what remains to be done in a given sitation.

M.L. Stiefel is an independent consultant in the area of systems design. He has had extensive computer peripheral experience.

Confessions of a disk pack reject

"I'm good. I know I'm good. Almost everybody says so. And I was sure I could make it as an RCA Disk Pack.

"The 6-high RCA 506. Some of my best friends are 506s. And some are 11-high RCA 511s. For disk packs, either is a goal worth striving toward.

"Anyway, I thought I had it made when I started my final physical at RCA. They checked my sense of balance. Went over my tracks. Examined the quality of my coating. Gave me the toughest mechanical and electrical tests in the industry.

"Those people don't miss a thing. I didn't even get to the final test, a chance to prove myself on a computer. Seems I had a slight case of the run-outs.

"What's a disk pack to do? I'm good enough to be somebody else's disk pack. But all I want to be is an RCA 506. And if I were 11-high, I'd want to be a 511."

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British Seek Coherent Picture

UK to Study Computer Industry Policy for the Decade

By Paul Broadhead
CW European Correspondent

LONDON – By July, a report of the British computer industry should be published and will be based on the findings of a six-month inquiry being undertaken by a five-man team under the auspices of a Parliamentary Select Committee on Science and Technology. The report will present to the government a sufficient foundation on which to build a policy for the industry over the next decade.

Collectively known as Subcommittee D of the Select Committee on Science and Technology, the five-man team includes Parliamentary members Airey Neave, chairman; Arnold Gregory, Ted Leadbitter, Eric Lubbock, and Eric Moonman. During the six-month period they expect to hear evidence from manufacturers and service organizations, professional and official bodies, users, and the Ministry of Technology. They also expect to visit manufacturing sites in the UK, and time permitting, in Europe and the U.S.

Set of Guidelines

In order to achieve a coherent picture of the industry within the time period, the committee has formed a set of guidelines – not the least important of which is to try and establish what the policy of the British Government is towards the purchase of computers for its own use. Other guidelines include trying to establish a growth pattern for the British industry, taken in isolation and in comparison to the rest of Europe and the rest of the world – and thus to establish the potential strength of the British industry, in terms of imports and exports over the next decade.

Unlike the central government in the U.S., the British Government has no publicly stated policy relating to the purchase of computers – and, in fact, displays an almost alarming degree of coyness when asked what policy, official or unofficial, is actually adopted. The issue is further clouded by the complexity of the ordering structure within the central government.

Knowledge Gained

Only witnesses appearing before the committee on behalf of the British Computer Society (BCS) have so far been able to claim any real knowledge of the government policy. This knowledge was gained in a professional capacity, outside the scope of their interests as voluntary officers of the BCS, and could therefore be considered outside the scope of that particular session.

The first witnesses to appear, International Computers Ltd. (ICL) – Britain's major independent manufacturer – claimed that the lack of a policy was prejudicial to its chances of obtaining orders for the most advanced and exciting projects undertaken by the government.

Buy-British Policy

Both IBM and Honeywell, the only other manufacturers to appear so far, claimed that the government operated a definite buy-British policy, which, as it is not clearly stated, often involves them in costly and worthless tenders. The policy, according to IBM, was to buy British unless a foreign manufacturer could either offer a 25% saving in cost, offer 25% better performance at the same cost, or offer some unique feature. Honeywell, which manufactures all computers for destinations outside the U.S. and Japan in the UK – was perplexed that it was not considered a British company, and produced some basic statistics on 75 central government orders, showing a definite bias to buy ICL equipment (69 orders were ICL, four IBM, and two Univac).

On two matters, all three manufacturers were in agreement: all would like the government to publish the reasons why a particular system is chosen for a particular installation, and all believed the government to be old-fashioned in its acceptance of the computer (as a generalization); all would like to see more adventurous projects, in medicine, education, etc., undertaken. And all agreed on sole-source purchasing.

European Cooperation

ICL favored cooperation between the domestic manufacturers in Europe. In fact, it claimed it would like to see the European industry welded together in a unified body, able to compete, at least in the domestic markets, with IBM.

IBM, unlike ICL, believes the British market to have more potential than the markets of continental Europe – and believes that it will increase its share of this market over the next decade, while perhaps losing a part of its share of the European markets to the emerging domestic manufacturers.

Not unexpectedly, the company was somewhat defensive over its multinational image, and the reflection of this in the UK. The UK is not at present used as a manufacturing site for any of the more "glamorous" products within the 360 series – and thus it could be accused of importing the vast majority of computers installed here.

Honeywell took this argument a stage further, in a plea to be recognized as a British manufacturer, and thus obtain the advantages of favorable consideration for central government orders. This plea provided the main theme for the Honeywell evidence, and was based on the company's position as the only major U.S. manufacturer to concentrate all its ex-U.S. and Japan manufacture in the UK.

The Future

All companies agreed that the market over the whole of Western Europe (including the UK) is expanding, and will continue to expand over the next decade at between 20 and 35% compound – a figure further substantiated by that given by the BCS. All agreed that in future a greater concentration on large communications-based systems would set the trend of the industry: large users, they believe, will become more orientated to in-house time-sharing systems, while smaller users will tend to become bureau customers, possibly using a small computer to provide a limited in-house processing capability and an intelligent terminal capability.

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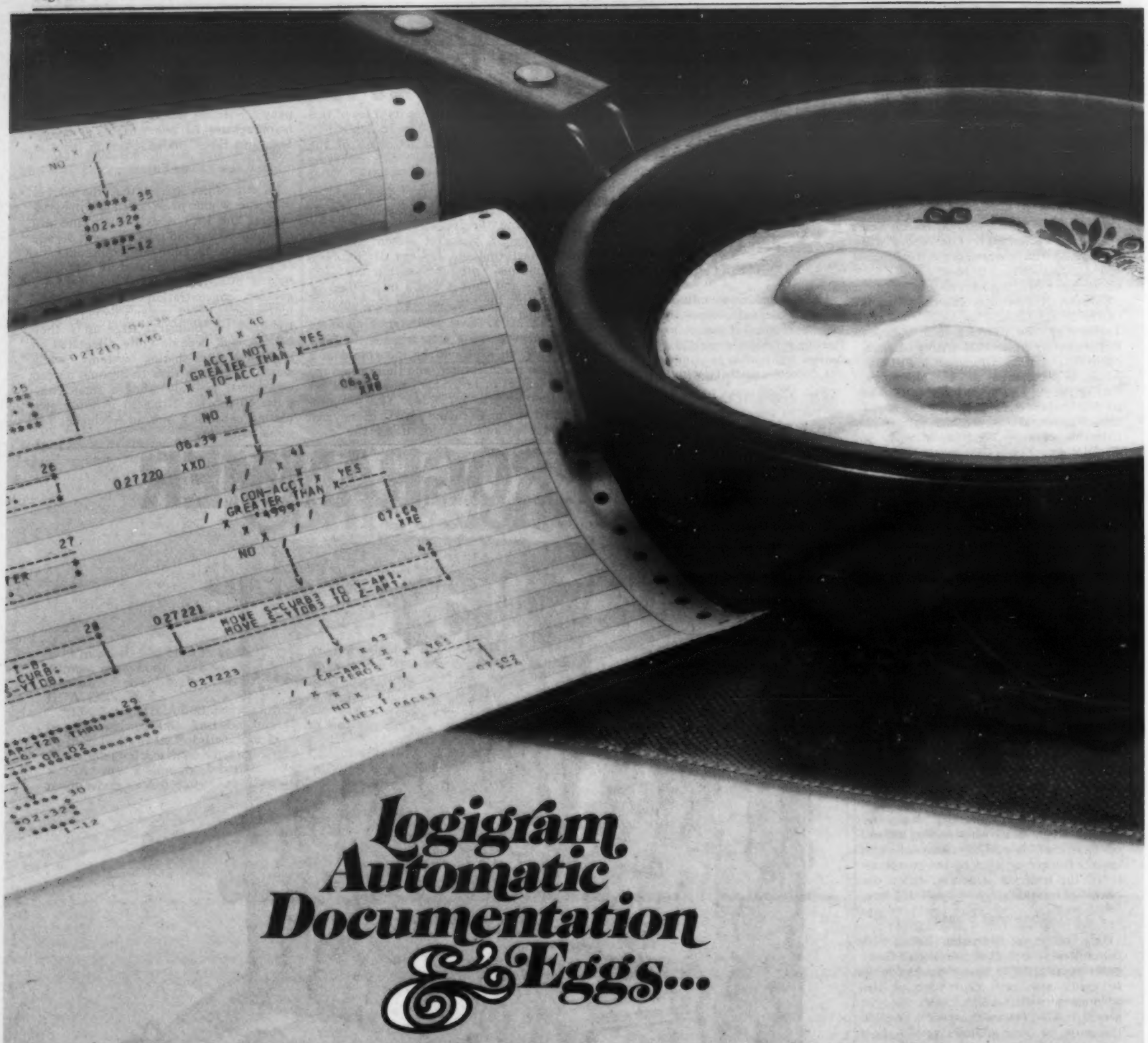

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Batch-Process Waiting Decreased

Terminal-Oriented System Debugs Cobol Programs

By Donald M. Leavitt
CW Staff Writer

ALEXANDRIA, Va. – A Terminal Oriented Commercial Applications Programming system (Tocap) has been developed by Data Technology, Inc. (DTI).

According to the developers, Tocap is intended to make Cobol "conveniently available" to a console-type terminal user. It includes several modules aimed at overcoming Cobol's current "unsuitability to the time-sharing world," according to DTI.

Functionally, Tocap acts as a precompiler. It accepts shortened Cobol statements, free-form decision tables, library subroutines, and source language debugging statements. All of these, DTI said, are translated into complete Cobol statements. The program thus created can be used on a load-and-go basis at the terminal or it can be compiled in normal fashion for use on any computer.

The Shorthand Translation module in the Tocap package is said to accept abbreviated mnemonics in place of often-used Cobol reserved words, phrases, and clauses.

```
      .
      .
000230    01 INR
000240         02 FL* P* X(40)
      .
      .
```

```
      .
      .
000230    01 INPUT-RECORD
000240         02 FILLER PICTURE X(40)
      .
      .
```

With the Shorthand module, the programmer gets the full Cobol data description from his abbreviated entry.

Cobol Coding

Another aspect of the Tocap system, the Decision Table Translation module, is designed to accept limited, extended, or mixed entry tables, and to produce Cobol coding covering each possibility expressed. A DTI spokesman said that implied or missing possibilities are detected and corrected through use of their Else rule.

There are two benefits gained from this module, DTI said. First, the programmer has a succinct method of entering rather complex logic. In addition, the translator provides automatic checking that all logical paths in a particular expression have been considered.

Through use of the Library module, Tocap allows data descriptions and procedures common to many programs in an installation to be placed in a library file. Defined once, they can be called from the library as needed. The library can be updated by the installation to meet its current needs.

The Library module is also said to give the programmer the capability of automatically inserting standard subroutines in the Cobol programs whenever called.

The Tocap debug package gives the programmer logic-trace and field examination capabilities. With this tool, DTI said, the user specifies which paragraphs and/or data fields he wishes to monitor. Coding is added to his program to write the desired information on a debug file for later examination.

Available as a proprietary system, the object programs for the Tocap system can be generated on any equipment that supports "even a low-level" Cobol compiler, according to DTI. For the execution of Tocap, users must have a minimum memory of 20K size of the largest module in the system. Machine size requirements for problem-program execution will depend on the user's individual programs.

Sale price of the complete Tocap system is $18,000 plus installation fees of "from $2,000 to $5,000." Installation includes any modifications needed to adapt the system to the user's hardware, source deck and listing, object decks, reference manuals and initial training of user personnel.

The modules can be bought as separate items, with the Decision Table Translation feature priced at $6,000. The other modules are priced at $4,500 each.

Data Technology Inc. is at 206 N. Washington St.

'Speedplot II' Provides Automatic Data Plotting

BELLFLOWER, Calif. – Speedplot II can provide an economical plotting capability for users who do not normally have access to a digital plotter but do have 102K memory and a line printer, according to the developer, Pacific Software Services Co.

Values can be plotted directly from input data or can be calculated using stored formulae. Speedplot II prints out in an 8-1/2 by 11 in. format and provides up to six curves per plot, the company said. The package allows variable X- and Y-axis scale values, labels, and limits under control of a seven-card control deck. The program allows a maximum of 15 X-axis and 36 Y-axis points.

Only significant values falling within the X- and Y-scale limits are plotted, but all values are tabulated, the company said. Calculated points for the plots are identified by plot number; curves connecting the points must be manually drawn.

A company spokesman said that the first two cards in the control deck provide the title line for the top of the plot and the X-axis scale line and divisions. He said that values to be printed along the X-axis can be generated by the program or can be entered by an optional third control card. The X-axis title is supplied by the fourth control card.

Variable data to be plotted against formulae previously stored is entered by another type of control card, which the company said includes initial values and desired intervals, on a one-card per-curve basis, to a maximum of six cards per plot. Alternately, fixed values for direct plotting are entered by a sixth type of control card. The actual plotting is set in motion by the seventh control card, which serves as a trigger.

The package will operate on any system that has a minimum 102K storage and a Cobol compiler. It has been run under OS/360 utilizing an IBM 1403 printer. According to the developer, it would operate equally well on an IBM 1443.

The program sells for $750, with an additional charge of $10 for documentation. Pacific Software Services Co. is at 17057 Bellflower Blvd.

Midwest Time-Share Network Ensures Users Against Hardware Dependence

ANN ARBOR, Mich. – The Cyphernetics Corp. now has a time-sharing network accessible to users in Michigan, Ohio, Chicago, and Pittsburgh. The network – the Cyphernet System – began operations late in 1969.

A Cyphernet System customer can use a terminal of his choice from his own location, as well as create programs or data files independent of particular device characteristics or manufacturer's product line, the company said.

With the system, a user can operate in a time-sharing mode, a conventional batch mode, or a combination of the two. Hardware for the sytem includes a DEC PDP-10 with Memorex and Burroughs disk units, which provide storage "exceeding 200 million characters." Equipment from several manufacturers ensures independence from any one product line, the firm said.

A library of proprietary programs available to Cyphernet users includes applications programs, problem-solving aids, and special services for engineering, manufacturing, marketing, and financial analysis.

String Handling

The Cyphernet System compiles and executes standard Ascii files written in an extended version of Basic which offers string handling, unified file I/O, and user-defined formatting, according to the company.

Cyphernet Fortran IV includes features said to exceed the American National Standards Institute's (Ansi) requirements. The Fortran compiler accepts Ascii input and targets it to a relocatable loader, allowing the execution of arbitrary combinations of subprograms, the company said.

Source programs for languages are coded in standard Ascii and may be sorted on any device, the company said. Data used by the Cyphernet languages may be represented in binary or standard Ascii.

Cyphernet Ascii files may be keypunched, built by another program, or typed at a remote communication device. The files are converted to Ascii if the input device does not provide it.

The Cyphernet command language, which accepts a mixture of command lines and text lines, is used to build data and source files from a remote terminal. The text lines are placed into a working file while the command lines are executed immediately. Commands are available for saving, retrieving, editing, preparing, and executing jobs, with execution accomplished in one of three modes:

- Class A, conversational time-sharing, can be used for executing highly interactive jobs, building files, or developing a new program. The terminal is always connected.
- Class B, foreground-initiated-batch, can be used for jobs set up by a user in Class A mode, and run as a background job stream. The user may disconnect from the system while the job is being executed, or may do some other work.
- Class C jobs are batch jobs which are run under control of the Cyphernet operator and, although they can be submitted to an input file from remote terminals, they are usually run on a deferred basis.

With the system, any remote device can operate in any of the three modes, the company said. If a high-speed device is inoperative, a low-speed terminal can be used. Similarly, any output device can receive the results.

The initial service charge is $100. Monthly charges are calculated on the basis of customer usage of terminal connect time, CPUs, and program storage. Terminal connect time (prime) is $10/hr with 10 to 15 char/sec terminals; off-peak time is $6/hr.

CPU time is charged at two cents/CPU, and is accumulated according to the formula: CPUs = page seconds x priority x software coefficient. Program Storage is charged at $1 per 1,000 char/mo.

The Cyphernetics Corp. is at 333 Maple Village Center.

Architectural Package Budgets Expense Costs on Pro-Rated Basis

GREAT NECK, N.Y. – Abacus, an architectural, job-oriented software package for budgetting expenses and controlling costs, has been developed by Professional Dynamics Corp.

Designed by architects for field-effective use, Abacus provides a clear, concise computer evaluation of the fiscal status of each job an architectural firm has in progress.

Abacus reports provide current and accumulated expenses, broken down and assigned to logical categories covering all pertinent aspects of a job, according to the company.

Percent of job completed and over/under budget figures are displayed for each category. The over/under budget calculation is made on a pro-rated basis to reflect only that portion of each expense category completed, the firm said.

Marketed by National Software Exchange, Inc., Abacus costs $5,000 or $185/mo on a lease plan for 36 months. Both prices include installation, training, maintenance, and documentation. The package can be delivered within 30 days.

National Software Exchange is at Station Plaza East.

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IBM Develops Ansi Cobol Compiler, New Assembler For System/360 Users

WHITE PLAINS, N.Y. – Users of the IBM 360 series now have available a series of new program products from IBM.

Ansi Cobol

An American National Standards Institute (Ansi) Cobol compiler is being developed primarily for Model 25 and 30 users. According to the company, the new compiler is a subset of the full Ansi Cobol, and it will run on Models 40 through 75 in addition to the smaller models.

Prime advantage of the compiler is that it requires only 32K in contrast to the 64K needed by the full Ansi Cobol. Other enhancements aimed at conserving core are expected to include segmentation, table handling, cross reference listing, and a condensed procedure map listing, IBM said.

Assembler H

Aimed at easing the programmer's task and increasing assembler throughput, Assembler H is for Model 40 and up operating under OS/360. This package includes extended language facilities, new operating and assembler options and improved diagnostics. With these improvements, IBM said that users of Model 65 and larger may be able to triple the compilation speed possible with IBM's Assembler F.

A third processor was previously announced as a time-sharing option. Code and Go Fortran is now being geared to operate as a batch processor under such other options of OS/360 as MFT and MVT. Purpose of the new capability is said to be speeding of throughput for users processing small jobs.

The new Code and Go Fortran requires a minimum of 88K bytes available storage under OS/360.

Prices

Plans now call for the Assembler H to be available this summer for $225 a month under a license agreement. With a similar type of agreement, the Code and Go Fortran will be priced at $275 a month and it will be ready in the first quarter of 1971. At $150 a month, the new Cobol compiler is expected to be available in the second quarter of 1971, according to IBM.

Datum Has Everything Under Control

Adding tape to today's most popular small- and medium-size computers is simple. Buy a Datum 5091 Magnetic Tape System and plug it in.

The 5091 has an IBM-compatible seven and nine-channel format and includes read-after-write parity check, generates VRC, LRC and CRC, and checks VRC and LRC. It's compatible with your computer's magnetic tape software. Available with up to four tape transports, it will read/write at 10-, 20-, or 30-thousand characters/second.

It comes with interconnecting cables, connectors, computer interface cards, and a software package that includes input/output subroutines, a comprehensive diagnostic routine and a maintenance routine.

For information about a Datum 5091 for any of the computers listed below, write or phone DATUM, INC., 170 East Liberty Avenue, Anaheim, California 92801. Phone Number 714/879-3070. TWX Number (210) 592-1289.

A Datum 5091 is available for any of the following computers:

HP2114	IBM 1130	Honeywell 124A
HP2115	PDP-9	Honeywell 316
HP2116	PDP-9/L	Honeywell 516
PDP-8	PDP-15	XDS CE16
PDP-8/L	Varian 620i	XDS CF16
PDP-8/i	CAI 816	Micro-Systems 810

Datum inc.

Management System Has Remote Ability

SANTA MONICA, Calif. – System Development Corp. (SDC) has available DS/2, a general-purpose data management system with remote interactive capabilities.

The DS/2, second in a family of proprietary software packages, needs no reprogramming to fit the user's equipment and uses standard 2311/2314 disk files, according to the company.

Operating under DOS on an IBM 360/25 or larger computer, the DS/2 gives the user of the system an extension of his existing capabilities. Total file security is maintained with all applications of the system.

The system adapts to a wide variety of applications, such as sales analysis, inventory control, salary administration, law enforcement, and municipal and medical recordkeeping.

The system has a basic monthly lease price of $450 and can be delivered immediately; the DS/2 has a basic sales price of $13,500. SDC will maintain the system for the duration of the lease. Installation and training in the use of the system cost extra.

The company is at 2500 Colorado Ave.

S. California Hospitals to Get T/S System

WASHINGTON, D.C. – The Hospital Computer Shared System (HCSS) will be offered to hospitals in southern California by the Causality Data Co., through an arrangement with Honeywell, Inc.

HCSS, a time-sharing system, can provide user hospitals with services ranging from patient accounting to responsibility reporting. It is presently in use at 160 hospitals tied into 16 data centers nationwide.

Causality Data will offer HCSS to the San Diego community first with later growth to include Los Angeles and Orange counties.

Causality Data is a division of the Stanwick Corp., with headquarters at 1735 K St.

Keytape.* The long distance operator.

If you're looking for a high-speed, low-cost communications terminal, look what Honeywell has for you: the Keytape Communicator/Line Printer.

It can transmit data over ordinary telephone lines at up to 2400 bits per second. Double buffering and message blocking features pack more transmitted data into any given time interval.

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The Keytape Communicator/Line Printer can operate in an unattended mode, too! So it's ready for remote polling whenever your central computer is.

And in its spare time, the Communicator can act as a basic data preparation unit...recording and storing your source data directly onto computer-compatible magnetic tape.

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The Other Computer Company:
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'Autodoc' Produces Documentation From Cobol

SUNNYVALE, Calif. – Autodoc, a documentation, debugging, and maintenance service developed by Applied Cybernetics Corp., is now available for Cobol users.

According to the developer, the Autodoc service produces documentation directly from Cobol source programs. Source input may be in the form of card decks, tape, or disk libraries, the firm said.

Output of the Autodoc service is a package for each program being processed. The package is said to include a cover sheet, source list, error list, record layout, data reference list, procedure reference list, special reference list, and either a detail flowchart or a logic chart.

A spokesman at Applied said that the cover sheet reiterates the identification division of the program. The record layout portion of the documentation provides full descriptions, including record length; blocking factor and data fields of records from the file; working-storage; and linkage sections of the data division.

The special reference list includes literals, figurative constants, externals, and systems names. It was pointed out that the user has a choice of format for the logic documentation, picking either the symbolic detail flow-chart or the narrative logic chart.

Charge for the Autodoc service is five cents/card or line in the source program being documented.

Applied's marketing manager Bill Lynd said that his company would be willing to provide a free sample of Autodoc documentation, using a Cobol source deck of up to 500 cards sent to him for the purpose, by users.

Applied Cybernetic Corporation is at 1285 Forgewood Ave.

Delta Has Bank Accounting System

WASHINGTON, D.C. – Delta Data Systems Inc. has completed an automated accounting system developed for use by banks involved in customer services.

The accounting system contains the Delta accounts payable, accounts receivable, general ledger, and payroll personnel systems.

The bank accounting and business management system, written in Cobol, is available for IBM, Honeywell, Burroughs, and NCR equipment. Originally designed for the IBM 360/30, the system can operate with 32K of core.

The service which can be purchased as a complete integrated system, is marketed under a perpetual licensing agreement for $32,000, including source decks, user and operator documentation, client personnel training, and system support. Each system can be purchased as individual modules for $10,000 to $12,000 a pieee.

Delivery can be made within 60 days, the company said.

Delta Data Systems Inc. is at 9903 Rhode Island Ave.

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Retrieval System Solves Audit Problems

EAST ORANGE, N.J. – Auditors with access to an IBM 360 can utilize the Computer Audit Retrieval System (Cars) developed by Computer Audit Systems, Inc.

According to the company, Cars is designed to perform a variety of audit functions on card, tape, disk, or data cell files. Functions provided include extraction, subtotaling, summarization aging, sampling, sequence checking, missing tickets or sequence gap detection, comparison of two files, and preparation of confirmation notices.

Software/ Services

A combination of certain functions can be performed simultaneously or singly, and editing or restructuring of the data base is not required by Cars. The system will handle blocked or unblocked files, with either fixed or variable-length records.

Written in Cobol, the present version of Cars operates on a 360/30 with a memory storage of 32K. The developer expects, however, to adapt the package to run on "any" system that supports "even a low-level Cobol compiler."

The Cars package sells for $4,000 which includes two days of training for two people. Computer Audit Systems also offers, at an additional cost, a variety of training seminars or in-house classes for customer personnel.

Delivery time for the package is said to be within four to six weeks.

Computer Audit Systems, Inc. is at 725 Park Ave.

Management System Processes Accounting Costs for Law Firms

KANSAS CITY, Mo. – Time/Track, a time management and accounting system, from Vaughan Computer Systems Inc. has been developed under multiple plans providing for internal use of service processing.

Developed in cooperation with law firms to satisfy their time management and billing requirements, Time/Track is equally adaptable to the requirements of any operation dealing in time as a commodity, the company said.

Time/Track provides its users with a position control of billing operations and receivables. It is a means of analyzing profitability of clients and productivity of employees.

Written in Cobol and operating under DOS, the system, which can run on a 32K IBM 360/25 or above, can be delivered immediately.

The process service costs $500/mo for a law firm of 15 attorneys. Purchased as a package, the price ranges between $6,500 and $10,000. All prices include installation and complete documentation, the firm said.

Vaughan Computer Systems Inc. is at Suite 1418, City National Bank Building.

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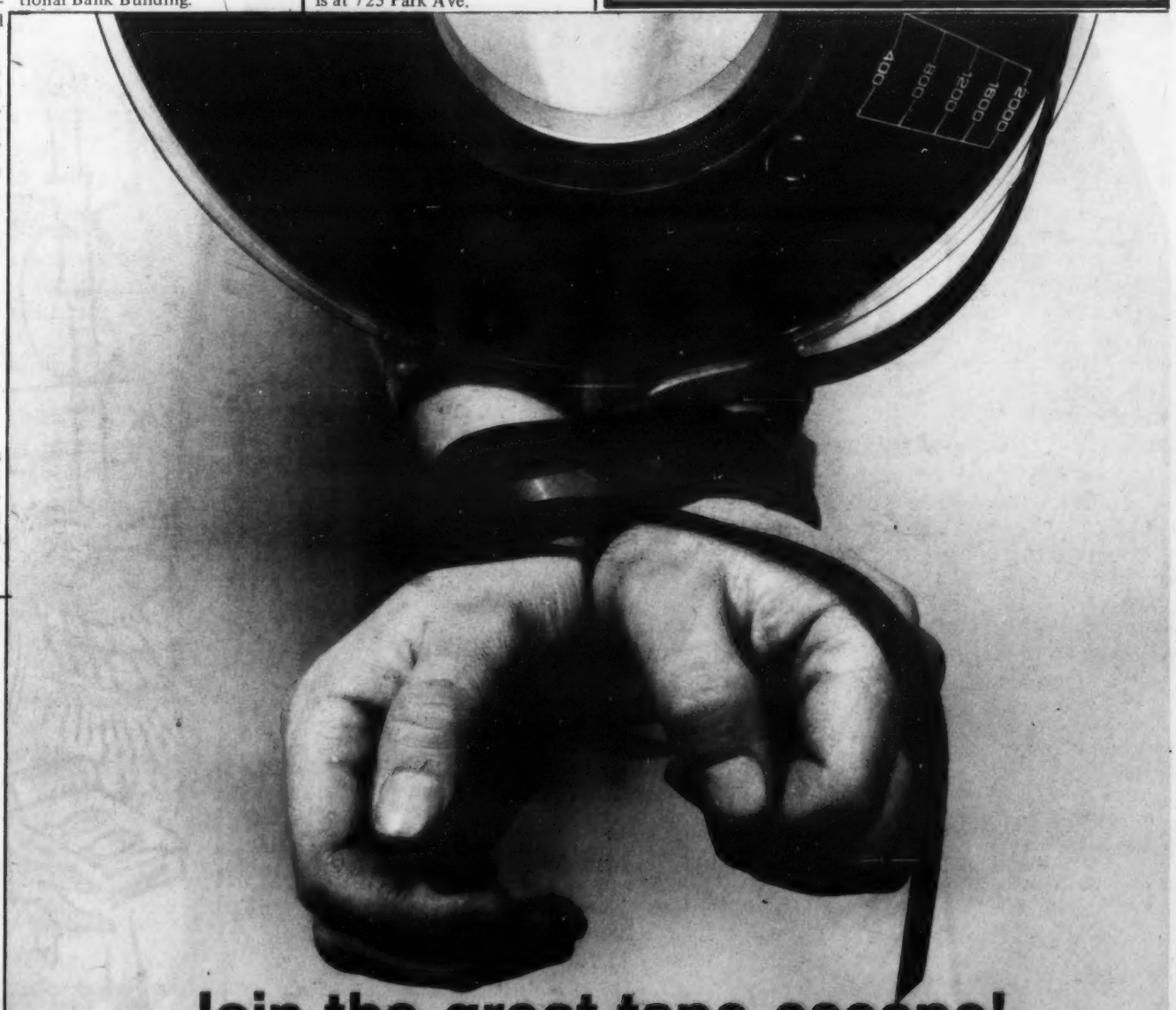

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Hungry CPU?

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Inforex feeds hungry CPU's. It does electronically what other forms of data entry do mechanically.

The Inforex system gathers data from eight keyboards into one disc memory unit. Data may be sight or key verified. Built-in logic performs check digits, left-zeros and balance totalling. Jobs are pooled onto 7 or 9-track compatible tape. Optionally, it will operate on-line directly to your central processor.

Keypunch/verifier functions. Starting with the familiar 64-character keyboard, each Inforex keystation performs all keypunch and verifier functions: Automatic check-digit computation. Automatic left zeros. No digit by digit keying is necessary. Electronic skipping and duplicating rather than mechanical. Auxiliary duplication or two additional levels of program control. Automatic + or − signing of fields.

Simultaneous entry and verification. All eight keystations input to one disc memory unit. Each keystation is assigned an area as it enters. Any keystation can access any assigned area at any time. Since each keystation has both sight and key verification capability, one keystation can verify work entered on another and if desired, verification can be done simultaneously with data entry.

Keyboard to tape functions. Inforex automatically pools input from up to eight keystations onto 7 or 9-track compatible tape. One easily entered statement transfers a series of batches. Only one keystation is required to initiate the transfer, and all keystations are functional during transfer. There are no cartridges to handle or identify, no special equipment needed for pooling.

Recallable programs. Each program has four levels of control. Once the program is keyed, it can be stored for future use and recalled by any operator merely by keying its appropriate program name. Up to 128 different program controls can be stored. There's no program card or tape mounting and no repetitive program control keying.

Self-balancing. Zero balancing is an integral part of the Inforex system. Each operator may accumulate a control total during data entry. Edit controls allow rapid correction. Adjustments to the balance total occur automatically during verification.

125-character records. With Inforex Intelligent Key Entry, the record length is variable up to 125 characters.

Full record display. For added accuracy, each keystation displays an entire 125-character record with moving cursor and position counter. The system has a forms capability that allows data entry and verification in a "fill-in-the-blank" fashion. Operator messages for direct interaction with the system along with search and paging of a file are standard.

Attractive office decor. Inforex design innovation doesn't stop with the components. Each Inforex keystation is built into an attractive contemporary walnut and black steel desk designed for operator ease and comfort. And remember, the system is electronic, not mechanical, allowing a quiet, comfortable atmosphere to work in.

Inforex monthly rental cost is $50 per keystation. $560 for control unit (up to 8 keystations). $960 for a complete 8 keystation system, including maintenance.

Inforex, Inc., 21 North Avenue, Burlington, Mass. 01803 or, Inforex AG, Dornacherstrasse 210, Basel, Switzerland.

"Inforex it."

Fuel Oil Package Tailored for Small-Customer Firms

NEW YORK – Computer Property Corp. (CPC) has made its Monrobot computer fuel oil system, complete with computer, available for firms with 1,000 to 3,000 customer accounts.

The Monrobot computer fuel oil system prepares degree day delivery tickets, delivery invoices, credit reports, cash receipts journal, customer statements and aged trial balances, budget books, automatic service renewal, a report of deviations from expected deliveries, truck and driver statistics, and other reports.

In addition to fuel oil accounting, the Monrobot system does gasoline and TBA (tires, batteries, and accessories) billing and accounting. Also prepared by the system are payrolls including 941 and W-2 reports, and financial statements including departmentalized profit and loss, detailed general ledger and balance sheet.

The Monrobot system includes, in its $21,150 price, the computer, the Monrobot 11XI; a magnetic card unit; printer interface, either a standard IBM Model B typewriter or an IBM Selectric; and a printer.

The magnetic card unit stores on a single card the data required for each customer, including name and address, consumption data, recent delivery balances, and accounting transactions for the period, according to the company. The card is updated for each delivery or receipt, and the cards are read automatically to produce credit reports, statements, aged trial balances, and other data.

Data is entered directly into the computer on a small keyboard, reportedly eliminating an auxiliary tape punch or key punch. Conversion to the system requires setting up customer balances and other data on the magnetic card; the fuel oil dealer or CPC can set up the cards.

The system is written in assembly language and runs on the Monrobot computer. The basic program in the system can be tailored to individual firm requirements, said a spokesman.

Expanding fuel oil firms can start with the small system and add a variety of plug-in components, doubling the capacity of the Monrobot for an extra fee.

Documentation and installation are included in the price. The system (including hardware) may be leased on a five-year basis for $486/mo. Shorter term rentals are also available. The larger system costs about $8,000 to $10,000 more than the smaller $21,150 version.

Delivery of the system takes from 30 to 45 days.

Computer Property Corp. is at 7 Dey St.

Chemical Engineering Programs Added to GE Time-Sharing Service

NEW YORK – A series of application programs for chemical and petroleum engineers has been added to the GE commercial time-sharing service.

Called Apache (Application Package for Chemical Engineers), the package contains programs to assist engineers in minimizing the time and cost of redesigning refineries for the production of lead-free gasoline.

The programs also enable chemical and petroleum engineers to do flash calculations; simulate process units and plants; optimize plant designs; and run heat, mass, and energy transfer calculations.

A major segment of the Apache package is a series of routines for evaluating unit operations developed under contract to GE by Abcor, Inc. Called Cececs, the programs enable engineers to use time-sharing to calculate vapor-liquid equilibrium, thermal properties, and physical properties of process streams.

Apache includes the K*H program and data file developed by the Natural Gas Processors Association and adpated for time-sharing.

Another series of programs called Gepds can be used in designing hydrocarbon processing plants.

The cost for using the packages with the GE time-sharing service can be as low as $200 per month, according to the company.

GE also provides customer support, including training, program documentation, and application seminars.

Automatic Accounting Package Integrates General Ledger Usage

COLLEGE PARK, Md. – Integrated Accounting and Business Management System, a completely automated accounting system consisting of modules developed from Delta Data Systems' accounts payable, accounts receivable, payroll, and general ledger systems, is now available from Delta.

Written in Cobol, the system can be utilized on IBM, Honeywell, Burroughs, and NCR equipment. Originally designed for the IBM 360/30, the system can operate within 32K of core.

Although some restructuring was necessary, the overall system design still incorporates all the advantages inherent in the individual software packages, said Stuart Trooskin, vice-president of proprietary systems division.

Marketed at $32,000 under a perpetual licensing agreement, which includes source decks, user, and operator documentation, the price includes the services of an installation analyst to assist in system implementation and educating the client's personnel in the use of the system.

Delta Data Systems is at 9903 Rhode Island Ave.

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Sigma 7 T/S Operating System Goes To 128 Users

EL SEGUNDO, Calif. – With the development of the Universal Time-Sharing (UTS) operating system, users of Xerox Data Systems (XDS) Sigma 7s will have a system designed specifically for their machines. Previous operating systems from XDS have been intended for both the Sigma 5 and 7.

The company said that, when fully implemented, UTS will allow the Sigma 7 to perform on-line time-sharing for 128 users, local and remote batch-processing, and real-time processing concurrently. Operating systems now available from XDS allow for only two of these three services on a concurrent basis.

Through UTS, Sigma 7 customers will be able to take full advantage of such multiprogramming features as the memory map, multiport memory structure and high-speed information swapping ability, XDS said.

Capabilities for time-sharing and batch-processing will be available first under UTS, with real-time processing capabilities scheduled for final testing and delivery during 1971, according to present plans. The entire operating system will go to Sigma 7 users without charge.

The operating system is said to support the compilers and subsystems now available on the Sigma 7. A variety of utility packages will also be available.

Compatible on-line and batch versions of many of these packages are promised in order to permit users to work in two or more operating modes interchangeably, said the company. Programs developed on-line, for example, can be executed in the batch mode of operation, and batch-created programs can be executed from on-line terminals.

With these features, the company said, the user can choose the most efficient method of computation for specific problems.

'Eznet' Produces Pert Networks

ANAHEIM, Calif. – Systonetics Inc. has developed a software package, Eznet, which automatically produces Pert networks by digital plotter and extends beyond the firm's Ezpert system.

Each Eznet installed system is dedicated to a particular computer, Pert/Time system, and plotter configuration. A user with a 360/50 computer, PMS/360, and a 30 in. drum plotter would obtain Eznet (PMS-D); a user with a 6000 series computer, CDC Pert/Time, and a microfilm plotter would obtain Eznet (CDC-M).

The purchase price of $12,500 or $280/mo lease includes installation, documentation, and a perpetual warranty, the company said. The documentation consists of a reference manual, a users guide, and an operations manual.

Standard systems without customization can be delivered in 30 days.

Systonetics Inc. is at 600 N. Euclid St.

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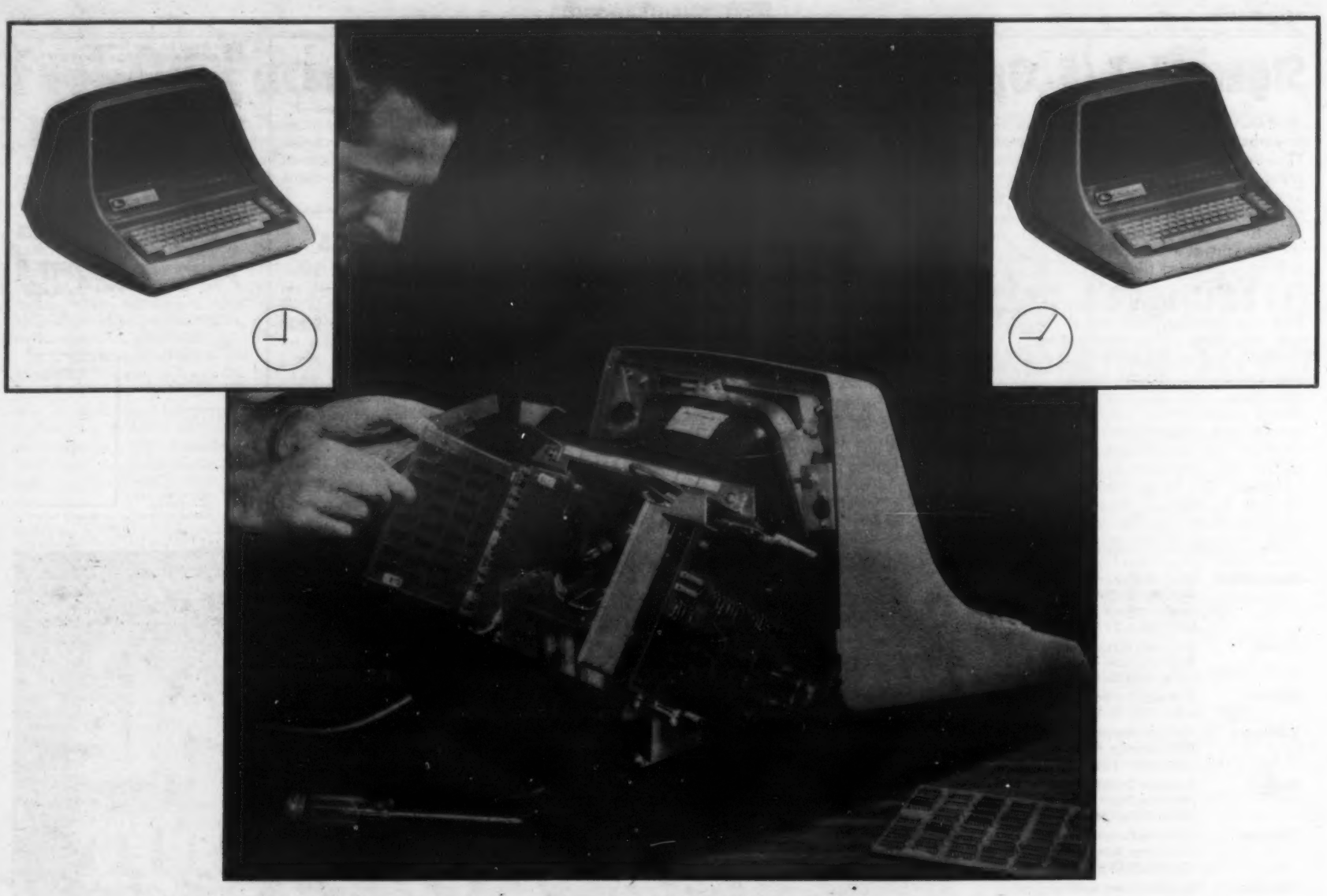

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Visit us during the Spring Joint Computer Conference, Booth 16500.

Delta Data Has 'Paging' Feature in Video Terminals

By Frank Piasta
CW Staff Writer

CORNWELLS HEIGHTS, Pa. – A line of three cathode ray tube (CRT) terminals featuring paging is available from Delta Data Systems.

Paging, claimed to be exclusive with Delta Data, is the ability to organize memory with more lines than can be displayed at one time. Other features include format mode, the ability to have fixed and variable data fields on the screen, and blink, the ability to blink automatically a character or groups of characters being displayed.

The three models available include the Telterm 1, a replacement for teletypewriters; the Telterm 2, a block-mode display that has editing, tabbing, and margin set capabilities; and the Telterm 3, compatible with the IBM 2265 display station.

The Telterm 1 is said to be software and plug-to-plug compatible with a teletypewriter at the end of a communications line. In addition to having a screen format of 80 char/line (27 lines), it has the ability to blink data on the screen, to format information and the paging capability.

The Telterm 1 is described by Delta Data Systems as being suitable for replacing a teletypewriter in general time-sharing and system time-sharing applications. The blink capability is said to be advantageous in applications where it is important to attract attention to the screen.

The manufacturer cites medical, inventory control, and process control as areas where this attention-getting device might be useful.

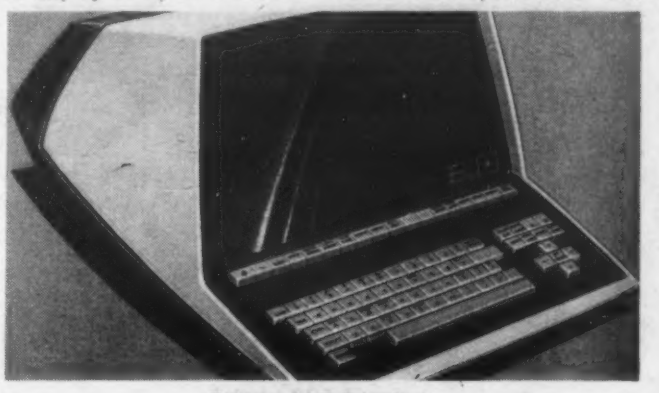
The format capability is designed to allow the teletypewriter user to be able to prepare a form for the specific job and then fill in the information as required.

In the paging system, the memory of the Telterm is so structured that it only stores displayed characters and control characters. This means that if only 20 characters are displayed, only 20 characters of memory have been used, although up to 80 character positions can be displayed. Thus, it is possible to have more characters in memory than may be put onto the display at one time.

Paging allows the display screen to act as a "display window." The window may be moved up and down, a line at a time, through memory so that all information may be displayed on the screen that is stored in memory.

Other features of the Telterm 1 include an MOS read-only memory for character generation, MOS shift registers for the refresh memory, and a screen format of 27 lines with 80 char/line. The refresh memory is modular, in 500 character increments, up to 2,500 characters.

Also offered on the Telterm 2 and 3 are margin set, tab set and clear, and line drawing which allows vertical/horizontal line.



Telterm CRT Terminal

Optionally available are upper and lower case fonts and a light pen to relocate the cursor and the create interrupts.

The units can transmit data up to 600 baud, and up to 9,600 baud optionally, asynchronously. Synchronous transmission may take place up to 420 bit/sec and up to 4,000,000 bit/sec as an option, the company said.

In addition to the features of the Telterm 1, the Telterm 2 and 3 models offer editing, the capability to insert and delete lines and characters; block-mode transmission, allowing data to be transmitted a message or memory at a time; and conversation mode, which is said to make it easier for the operator to communicate with the computer.

The Telterm 3 differs from the Telterm 2 in that it is software compatible with the IBM 2265. The ability of the Telterm 3 to have editing, formatting and blinking, in addition to the features of the IBM system, is said by the company to increase the power of a 2265-based system.

Prices established for the Telterm terminals are as follows: Telterm 1, $3,000; Teleterm 2, $3,500; and Telterm 3, $4,500. Deliveries are to begin in July, 1970 on a 60-day schedule, the company said.

Delta Data Systems is at Woodhaven Industrial Park.

DEC Compatible Communications Printer Handles 1,200 Single-Spaced Line/Min

By Frank Piasta
CW Staff Writer

STAMFORD, Conn. – A non-impact printer said to print at 1,200 single-spaced line/min in absolute silence has been developed by Path Computer Equipment.

Known as the Model 1200, the printer is intended for use as a communications terminal, or for on-line to a computer. Interfaces will be available to suit the entire Digital Equipment Corp. PDP line, as well as most Systems Engineering Laboratories processors, and Data General's Nova and Super-Nova. Communications devices can interface through a standard RS 232B device.

The unit prints all 96 Usascii characters – upper and lower case alphabetics, numerals, and special characters – at a rate of 96K char/min in the 80-char/line model or at 158.4K char/min in the 132-character print line version.

The printer employs an electronic/optical process described by its inventor, Joseph M. Klockenbrink, as using a strobe light in place of print hammers. A drum consisting of negatives of printable characters, roughly similar in concept to a drum in an impact printer, is used.

A beam of light is passed through the character to be printed and imaged on a photoconductive surface. This surface, in turn, is used to produce an image on standard paper stock by an offset process.

Through the use of interchangeable drums, a variety of typographic fonts are available. Drums can be changed on site by the printer operator.

Standard units are fed from paper rolls in lengths up to 2,000 ft. Either automatic cutting into 11-in. lengths or automatic take-up spooling can be provided. Paper width is 8-1/2 in. for the 8–character format and 14-7/8 in. for the 132-character line.

The only mechanical parts are trouble-free rotary devices, which make the printer exceptionally reliable and free from maintenance requirements, the manufacturer claimed. The character-imaging drum has been life-tested for approximately 10,000 hours of normal operation, the company added.

A one-line buffer is incorporated in the printer electronics. Control units with five-page buffers are optionally available.

The basic Model 1201, with an 80-character print line is priced at $16,000. The basic unit of the 132-character print line, Model 1202, sells for $20,000. Path had indicated that customer deliveries are to begin in June, on a two-month delivery schedule.

Path Computer Equipment, Inc. is at 65 Commerce Rd.

Solid-State Voice Response Unit Stores Vocabulary of 1,000 Words

HUNTINGTON, N.Y. – A solid-state voice response unit is being offered by Multiplex Systems (MSI), a division of Instrument Systems Corp.

The Model 700 voice response unit contains five predetermined phrases, according to a company spokesman.

The unit combines micro-electronic circuitry and multiplexing, and converts computer data into human voice readout. Words are stored in digital form in a solid-state memory, and the vocabulary can be accessed on a random basis.

With any voice response unit, the vocabulary can be increased to include over 1,000 words, the company said.

Features of the Model 400 include multiple simultaneous voice outputs, telephone tone signal data conversion for input, incrementally expandable vocabulary storage, incrementally expandable I/O capability and self-contained computer interface.

The unit interfaces directly with the I/O channel of a general-purpose computer and can be controlled like other peripheral units with available hardware and software, the company said.

Auxiliary units are available to expand vocabulary size and the number of I/O channels. A complete system can be built to over 1,000 words of vocabulary with a 64-station access, the company said.

The Model 700 basic voice response unit with a 50-word vocabulary, two two-way phone interface channels, and one general-purpose computer interface is priced under $15,000. Present delivery is four to six months.

Multiplex Systems, a division of Instrument Systems Corp. is at 770 Park Ave.

Tape Converting System

ENGLEWOOD, Colo. – Computing Corp. of America, Inc., Styran Division, has available a 500 char/sec converter system that converts BCD or ASC paper tape to seven-or nine-track mag tape.

The systems, priced at $14,950, also convert paper tape to hard copy or keyboard to mag tape at speeds up to 15 char/sec, the company said.

Computer Corp. of America, Inc., is at 3375 S. Bannock.

Reader Scans Mixed Data To Speed Processing Cycle

By Christine Magnuson
CW Staff Writer

E. HARTFORD, Conn. – An optical character reader, which can read both pages and documents off-line, is being offered by Scan-Optics, Inc.

The Model 20/20 optical character reader produces magnetic tape, includes a multi-purpose page and document handler, scanner, control computer, seven- or nine-track magnetic tape transport, and I/O console. The unit has a modular design for the addition of optional features.

The device also has a simultaneous scanning-microfilming capability, and the 20/20 will accept page sizes from 3 in. by 4-1/2 to 9 in. by 14 in.

The scanner has a reading capability of up to 2,000 char/sec. In turnaround document applications where the number of characters to be read is normally less than 100 and the documents are about 3 in. by 7-1/2 in., the device reads up to 500 document/min., the company said.

The device reads 8-1/2 in. by 11-in. pages, having about 1,800 characters each, at a rate of about 50 page/min.

Input formatting is under program control, and a maximum of 80 char/line (10 char/in.) can be handled. A maximum of six line/in. can be scanned, but free and fixed formats can be accommodated in the same scanner pass, the company said.

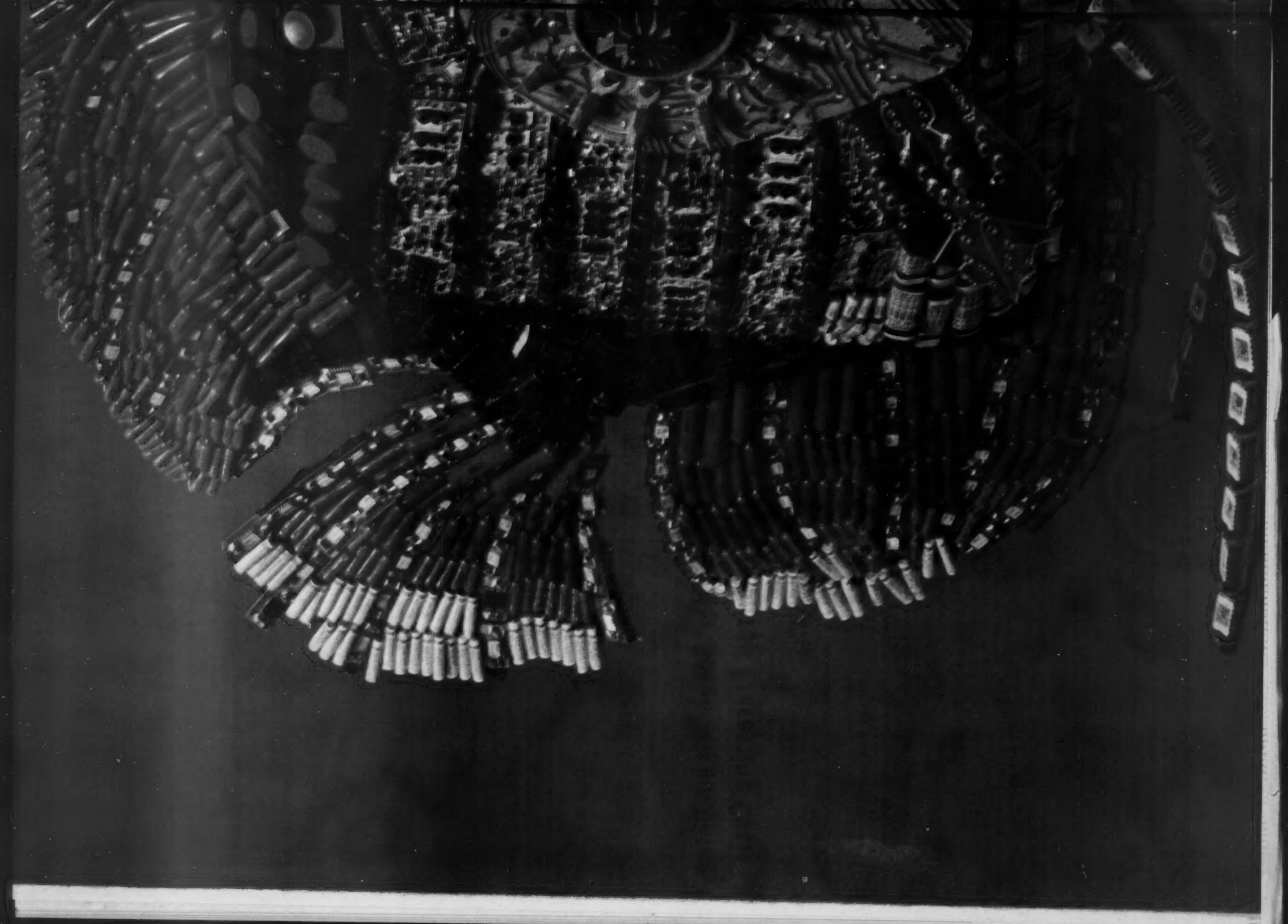
A systems software package includes extensive editing, formatting and error control functions. Scan-Optics general purpose higher level software has been designed to facilitate error checking techniques such as check digits and batch totals. The software has provisions for selective verification by retyping or rewriting of crucial data on the same page by a different typist or writer, the company said.

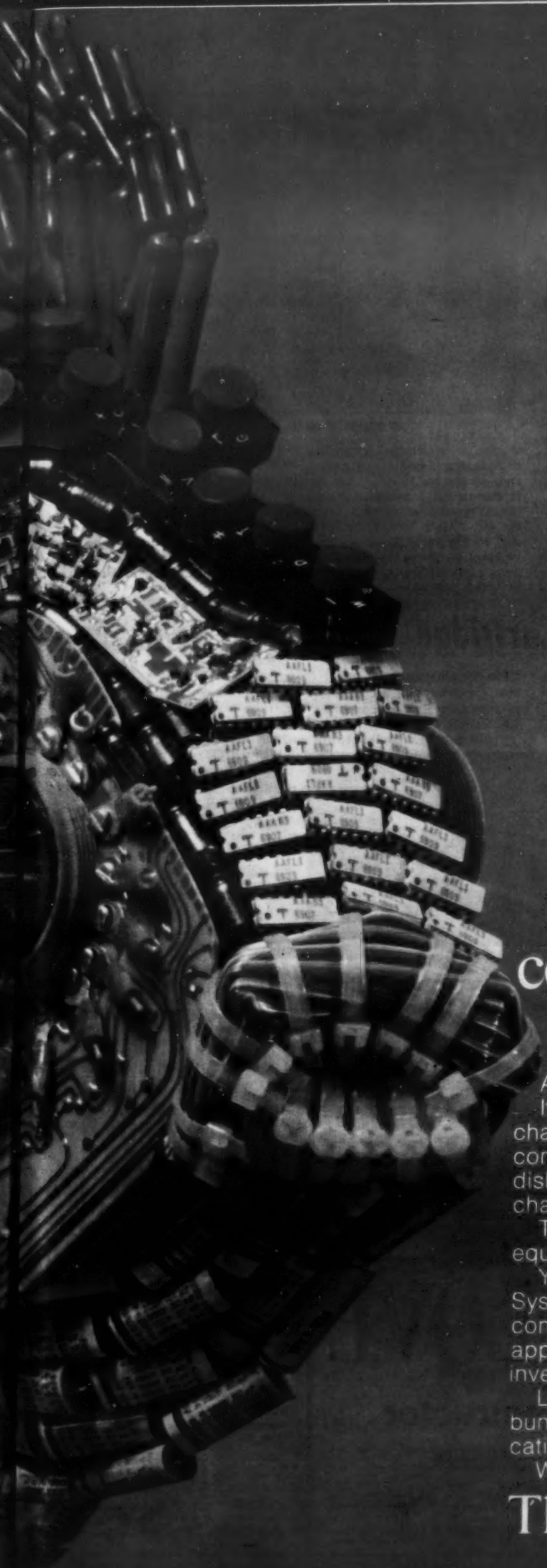
Dual output stackers are provided; additional output stackers are available in multiples of two for sorting applications. To minimize throughput, the feeder may be loaded and the stackers unloaded while the machine is operating.

The reader handles a variety of fonts which include OCR A numeric and alphanumeric, OCR B, IBM 407E, 1403, and selfcheck 7B and 12E.

August for around $100,000; lease price will be around $3,100/mo including field maintenance, according to a company spokesman.

Scan-Optics, Inc. is at 22 Prestige Park.





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HP's 32-Terminal System Uses Low-Cost Devices

PALO ALTO, Calif. – Twice the capacity at a 30% increase in cost to users is said by Hewlett Packard to characterize the HP 2000B time-sharing system.

An extension of the 16-terminal 2000A, the 32-terminal 2000B is said to provide conversational Basic-language processing at a cost per terminal below that of comparable time-sharing systems in use.

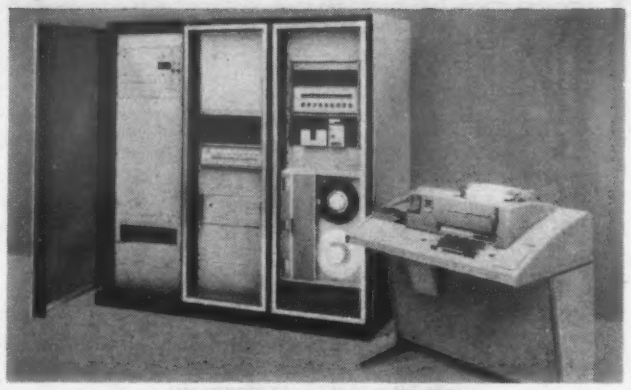
The HP 2000B uses the HP 2116B computer, a 16-bit machine with a memory cycle time of 1.6 μsec, and has a 16K-word core memory. A second computer, the HP 2114B minicomputer with 8K core memory, handles the terminal input output processing. In the minimum configuration, mass storage is provided by a 12-Mbit drum. More mass storage can be added if needed, HP said.

User terminals available are ASR 33 or ASR 35 teletypewriters or compatible devices. Any terminal, according to HP, may be direct-wired to the system if within a one-mile radius, or it may communicate with the system via telephone lines through the use of a Bell Datafone.

A software package is provided by HP. The HP time-shared conversational language reportedly incorporates many extensions of Basic. These extensions include string variables, additional matrix operations, and data files.

In the HP 2000B, software has been further augmented by several features to include program chaining, which allows one program to call another; common storage, which enables programs to have a common storage area; and access to 16 files, which represents an increase of eight over the number allowed with the HP 2000A. When more files are needed for a program, the program can be segmented into several chained programs, each of which can access 16 files. In addition to the Basic features, a number of applications software packages will be made available, the firm said.

Hewlett Packard said that the 2000B does not make obsolete the 2000A and the latter version will continue to be available. 2000As reportedly can be upgraded to the B version.

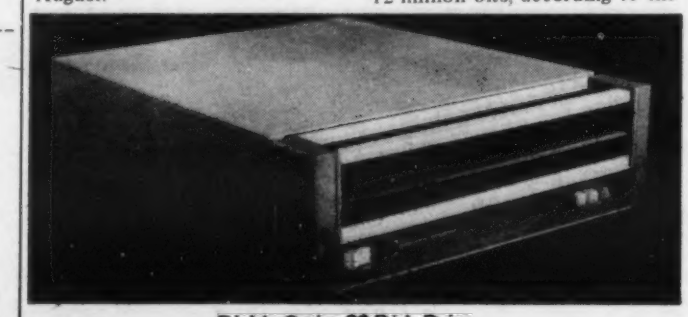


HP 2000B Time-sharing System

Removable Cartridge Disk Drive Offered

HAYWARD, Calif. – A removable cartridge disk drive priced at $4,950 will be available from Diablo Systems Inc. in August.

The Diablo Series 30 Removable Cartridge disk drive, single or dual cartridge system, has a file capacity per cartridge of 12-million bits, according to the company.



Diablo Series 30 Disk Drive

The system uses the IBM 2315 cartridge or equivalent, which is priced separately. The unit weighs about 25 pounds and is 6-1/2 in. high.

The company estimates that the drive will operate for several years without requiring repair. Average power consumption is under 100 watts.

Control of head positioning and spindle speed uses solid-state electronic techniques. Potentiometers, photo cells, and mechanical detents are not used in the drives, according to George Comstock, president of Diablo.

The Series 30 drives have a minimum track-to-track positioning time of 15 msec and an average time of 70 msec, both including settling time.

Diablo Systems Inc. is at 23950 Clawiter Road.

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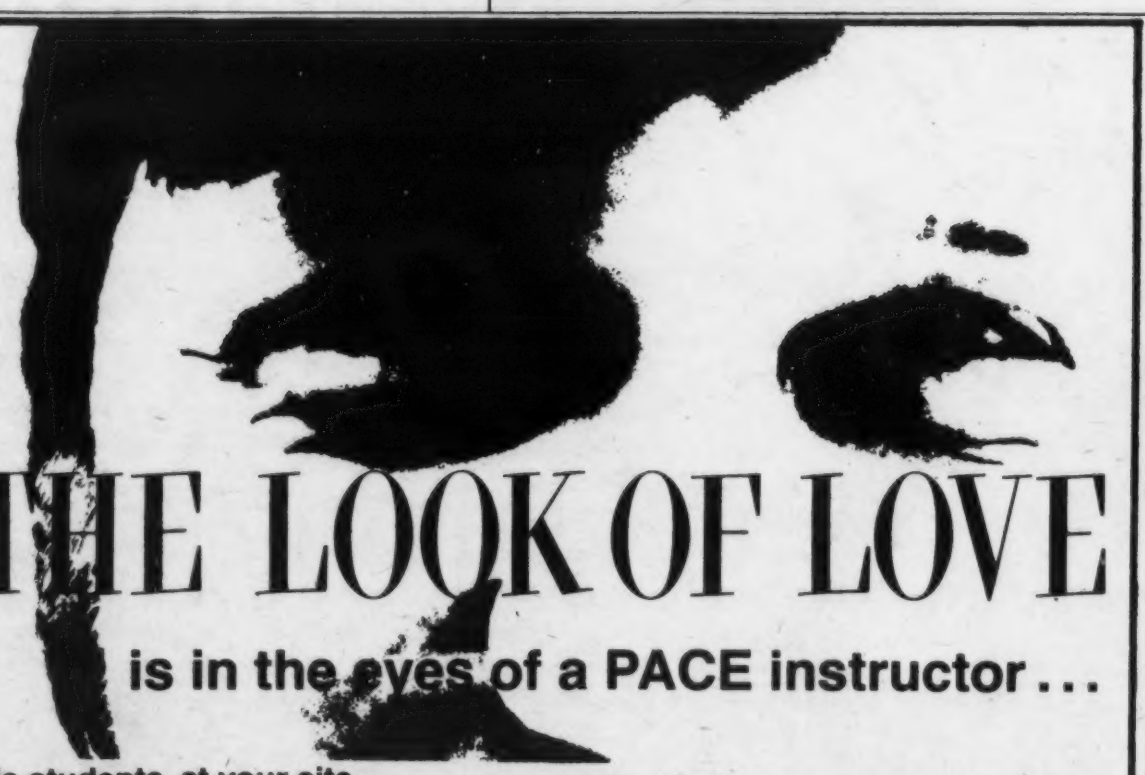

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Centralized Information Center Would Set Basis for EDP Decision Making

Thomas C. White is director, public information and education services of the American Federation of Information Processing Societies (Afips). This article, the first of two examining current and projected manpower needs in EDP, is based on his remarks at a recent American Management Association briefing session entitled "The EDP People Picture."

By Thomas C. White

There is no single, simple solution to the long-range problem of obtaining the necessary, qualified entry-level personnel in EDP. Yet this should not render us immobile. The basic tools are at hand, and the answers ultimately lie in our *cooperative* efforts in analyzing the "people problem," obtaining the required data, and formulating and implementing workable plans of attack.

Even these actions will tally limited results at best, unless an improved working relationship emerges among industry, user groups, government, professional societies, and all levels of the academic community. The alternative is a morass of inactivity, isolated efforts, inadequate planning, and needless duplication of effort.

If projected annual requirements of 150,000 additional systems analysts, programmers, computer operators, and technicians prove at all valid, prompt action is mandatory. Three areas in particular deserve immediate attention: statistical assessment of needs and resources; closer cooperation with the academic community; and constructive interaction with the private EDP school sector.

Determining Overall Needs

Action must be based on sound knowledge of the current situation, potential resources, and anticipated growth. But without in-depth statistical information and projections, meaningful assessment is an impossibility. Unfortunately, there is a dearth of information in some areas of EDP, and much of that available lacks verification.

Further complicating the picture is the lack of a central mechanism at the governmental level to compile, analyze, and distill relevant data; establish common definitions and statistical bases; and provide a coordinated procedure for updating.

Much the same is true in the private sector, frequently complicated by the proprietary nature of some data and a lack of distribution beyond the original source.

It is crucial that we begin now to establish a sound source of information for our field – a common, frequently updated tool to guide the decision-making process. Such an information center would serve as the basis of guidelines for the academic community, government agencies, and schools. It would also minimize the risk of providing thousands of people with the wrong training for the wrong jobs.

The professional societies share a major obligation in determining needs, resources, and desirable action. Toward this end, Afips plans to initiate three major statistical research programs this year, provided the necessary funding and industry cooperation are forthcoming.

The first will be a national survey of EDP manpower furnished by sources other than four-year colleges. Special emphasis will be placed on entry-level requirements and on the contributions of community colleges and private EDP schools toward meeting these needs.

The second will be a broad program to correlate existing statistical data on the information processing field, supplemented by additional research in areas where critical data is scarce or nonexistent. Areas covered will include hardware, software, and manpower.

The third study will be a personnel survey of members of professional societies in the computer field, with emphasis on the 10 Afips constituent societies. Areas to be covered include general personal data, education, employment, professional activities, and salaries.

Higher Education

The past few years have seen a dramatic growth in the computer-oriented programs and facilities at colleges and universities. Student enrollment in such programs has been explosive.

College-level programs will probably be able to meet our needs for computer scientists, research and development personnel, and highly trained specialists. However, there seems little chance that they will serve the decade's demands for systems analysts and programmers as satisfactorily.

Figures developed by The Computer Sciences Project of the Southern Regional Education Board indicate a total of about 27,000 students enrolled in computer-related degree programs in 1966-67. This includes both the undergraduate and graduate levels and represents a five-fold increase over 1964-65.

Looking Ahead

Using these figures, plus data on campus computers either installed or on order, we believe enrollment for 1970-71 may be on the order of 60,000. Extrapolating this data, it is not unlikely that total enrollment could hit 120,000 or more during the Seventies. But even 30,000-40,000 graduates each year will not solve all our problems if current figures on manpower needs hold true.

However, these figures are weighted strongly by major universities offering programs up through the Ph.D. level. These schools account for 78% of the estimated expenditures by all colleges, universities, and junior colleges for computer equipment and its operation. They also account for about 80% of manufacturers' contributions and approximately 90% of government funding.

In terms of curricula and enrollment, they offer the majority of programs in computer science, but only 10% to 12% of those in business data processing. More than 60% of all undergraduate computer majors in schools offering at least a four-year program attend these institutions, along with 87% of the graduate majors.

Computer degree programs will undoubtedly flourish at institutions offering doctoral degrees. But we have barely scratched the surface. The 1,300 institutions offering the masters or bachelors as a terminal degree account for only 20% of the estimated 560 EDP-related programs. And the vast majority of our 800 two-year colleges do not offer any formal programs in computing.

White's second article will pinpoint some areas of opportunity for college-industry cooperation and examine the role of the independent computer school.

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NMA Convention to Hold Seminar On Computer-Output-Microfilming

SAN FRANCISCO – The 19th annual convention of the National Microfilm Association (NMA), slated for April 28-30 here, will include both a seminar and users conference on computer-output-microfilming (COM).

The seminar will cover the mechanical, optical, electronic, software, and materials aspects of COM. A discussion following the presentation will include two COM users. Ian Mallender is chairman.

COM represents the union of microfilm and computer technology, making it possible to transfer computer-stored data onto film in page format in varying styles and sizes, bypassing the conventional metal typesetting process.

An attendance of 12,000 is expected to view about 100 exhibits. For additional information, contact Daniel J. Edelman, Inc., 1717 Pennsylvania Ave., N.W., Washington, D.C. 20006.

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For information regarding any or all of the 70 Series Accounting Systems, please call or write:

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Disabled Enabled by 'Hep'

Program Prepares Shut-Ins for DP Jobs

By Kate Rachstein
CW Education Editor

WASHINGTON, D.C. – New ways of utilizing technological advances for training and employment of severely disabled homebound persons, some of them in data processing, are being developed in a pilot project at George Washington University.

Under the supervision of Thomas R. Shworles, assistant professor of medicine and a vocational psychologist, the three-year demonstration project is sponsored by the Social and Rehabilitation Services, Department of Health, Education and Welfare.

"The whole idea," said Shworles, "is to go into business information systems and show that the new equipment and the new technology open up career possibilities for homebound people." Citing the paucity of vocational opportunities for the disabled, Shworles said that until now, most homebound persons have been confined to activities such as telephone sales. "So we're experimenting with things like remote terminals, and among other things, have taught programming to nine patients in this way," he said.

In addition to programming, three other target areas have been identified for the program: data input operations; microfilming; and bookkeeping, via terminals.

Hep

Dubbed "Hep" (Homebound Employment Project), the effort grew out of frustration, according to Shworles. "It had become increasingly apparent," he said, "that people who could walk into and out of my office were getting better breaks from the community rehabilitation services, but those who were rolled into and out of my office were getting hardly any help at all."

Beginning with an evaluation of four hospitalized patients in 1968, Shworles said that use of a printer-reader sparked the idea of training more patients for some of the more recently developed equipment.

Patient "clients" range in age from 18 to about 55, he said, and are usually referred to the project by state departments of vocational rehabilitation as "infeasible for vocational rehabilitation."

Shworles said a seven-step procedure has been designed to insure the client's readiness to work.

Students from the university provide assistance in psychological testing, physical adaptation, and training. But, Shworles said that the project also utilizes the services of a social worker, an occupational therapist, a psychologist, an engineer, and physicians.

Bloody Noses

"We intend these people to be competitive in the employment market," Shworles emphasized, "because we've found out just how dollar-oriented the business community is, and have gotten a few bloody noses in the process. . . . We've gone to small companies and said: "We can do your books, we can give you beautiful printouts, and you couldn't get this for three times as much any other way.' But as soon as you mention disability or the concept of doing it at home, many of them turn off. . . . It's really hard to understand, since we cover the overhead for the first year, our prices are certainly competitive, and our EDP training has been by IBM and GE."

The project has secured 12 employers now, though, and hopes to attract favorable attention to the project through them. "We didn't have one person employed by June, and now we have 20," Shworles said.

Languages taught so far are Basic, Fortran IV, and Cobol, and ASI 33 teletypewriters enable communication between two patients or between an instructor and a student, he added.

The major goal now, said Shworles, would be education of rehabilitation agencies, which, usually have the requisite funds, facilities, staff, and placement sources, but don't know what to do with homebound people.

COMPUTERWORLD

education

Business Managers Taking Intensive Systems Course

PHILADELPHIA – The University of Pennsylvania's Wharton School is offering a series of eight-week information systems and management science courses for business managers taking on project responsibilities in the systems design field.

The course was originally developed in cooperation with the American Telephone and Telegraph Co., and more than 300 students have been graduated from the school's systems design training program in the techniques and concepts needed to design and implement advanced computer-based information systems.

The course requires students to "live in," facilitating participation in evening project assignments. Enrollment is limited to 28 students per class. Each course includes work with on-line simulation models, access to time-sharing terminals, and study of quantitative techniques in decision-making, computer technology, and systems design, according to the school.

Each student accepted receives precourse study material covering areas such as algebra, statistics, probability, and programming fundamentals, requiring about 100 hours of self study.

Five eight-week courses are planned for the 1970-71 academic year, the first beginning April 27. John B. Schnell, Warwick Hotel, 17th and Locust Streets, Philadelphia, Pa. 19103, is course director.

CPAs Learn to Advise Clients on DP Installation and Conversion Problems

JENKINTOWN, Pa. – A course on the installation of computer systems has been developed for the American Institute of Certified Public Accountants (AICPA) by Computer Conversions, Inc., a firm specializing in EDP conversion assistance. The course is designed to enable member accountants to direct and advise their client companies during preparation and installation of a computer system.

According to J. Burt Totaro, Computer Conversions vice-president, "The accountant working in a data processing environment has historically been kept on the periphery of most EDP activities. He's often been regarded as uninitiated, and, therefore, excluded. And yet, because of his experience and sound knowledge of business and financial practices he can often prevent otherwise impressive computer installations from becoming financial disasters."

Totaro said that the course presents the accountant with a master plan that has proved successful in actual installations. He is also provided with a series of standard forms and checklists that can be used to assist in discrete system conversion activities and to monitor the progress of each activity.

Among the principal conversion and installation activities treated are: planning and scheduling, formulating a system conversion team, converting files and programs, personnel training, developing programming standards, documenting the new systems and programs, designing and preparing the computer site, testing programs and procedures, cutting over the new programs to the new equipment, and evaluating the system after installation.

The course will be offered initially in Cherry Hill, N.J. May 11 and 12.

Central Catalog Grant Given OSU

COLUMBUS, Ohio – The U.S. Office of Education has awarded a $90,135 grant to the Ohio College Library Center at Ohio State University for the development of a computerized regional book cataloging system.

The director of the center and professor of library administration at OSU, Frederick G. Kilgour, said the grant will enable the establishment of a computerized, centralized catalog for 51 Ohio college libraries.

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David Frost Spotlights Idiiom CRT

The Information Displays, Inc. Idiiom CRT display system was featured on the David Frost Show, March 25, in a demonstration of interactive computer graphics capabilities. Using a light pen as a cue stick, the operator played pool on the Idiiom's CRT screen. The Idiiom computes the carom angle of each ball, friction, and keeps score for both players.

Insurance Co., IBM Sign Contract For Total Information System

By Donald M. Leavitt
CW Staff Writer

GALVESTON, Texas – A three-year "multimillion dollar" contract with IBM has been signed by American National Insurance Co. (ANI).

The first major contract for IBM's custom contract services department, the project will be aimed at developing what is described as "a company-wide . . . system to serve every level of need – from fileclerk to company president."

Called "Advanced Real-Time Total Information System" (Arttis), it is said to be the first system of such scope to be utilized by the life insurance industry.

Data Up-Date

Initial plans call for hundreds of visual display stations and keyboard communications terminals to be tied to 360/65s. Phil B. Noah, president of ANI said: "Arttis will allow us to update files as transactions occur, and we'll be able to retrieve – almost instantly – information about any of our operations."

Cecil P. Webb, vice-president, custom contract services for IBM, said that his team will design Arttis with 18 major subsystems corresponding to the functions handled by American National's major operational areas. They include ordinary and combination agency administration, ordinary and monthly debit ordinary, accident and health, industrial, actuarial, policy loan service, mortgage loans, securities investment and personnel administration and training.

Although IBM has responsibility for design and programming of the new system, spokesmen at American National spoke of a "constant and complete interface" between the IBM and ANI staffs. During the development of the system, members of each staff will, in fact, be working in the other's offices. This will permit not just periodic, but day-by-day checkpoints of progress, according to ANI.

User Terminals Coded

The system will allow clerks to enter policy change data directly or to retrieve any information needed, although user terminals will be coded to prevent unauthorized disclosures of information.

Arttis is also expected to be used for cumulative totals, comparative reports, and other management information, on a "right-now" basis.

No one at IBM or the insurance company could estimate the final cost of the Arttis project beyond saying that it will be in the "multimillion dollar" range. Contracts with IBM's custom contract services department are all on a "time and materials" basis.

Target date for completion of the first subsystem is mid- or late 1971, and is expected to coincide with completion of ANI's new home office building, and delivery of the 360/65s for which the system is intended.

New DP Business Practices Initiated by IBM Abroad

ARMONK, N.Y. – IBM companies in 15 European countries, and Australia, New Zealand, and South Africa have announced new DP business practices, according to Robert Morris, company spokesman.

Under the new practices, certain types of systems engineering activities, most computer programs, and most customer DP education will be offered for a charge. The new practices will offer users an opportunity to choose the type and quantity of required support services.

IBM in the United States and IBM Canada Ltd. announced similar new DP practices last year.

For IBM systems and products announced after March 25, 1970, the IBM European companies will offer SE services in three skill classifications at extra cost. Additionally, users will have access to various support services through support centers similar to those announced for European users of System/3.

New professional courses (courses which teach users' employees DP skills associated with the application of IBM DP equipment) announced after March 25 and relating to new products will also be available for a charge.

New programs announced after that date will be designated as either system control programming or program products. System control programming (programming essential to the operation and maintenance of the system) will be announced with future systems, and will be furnished without a charge. Other new programs will be announced as program products and will be offered for a monthly charge under a license agreement.

Because of government regulations and procurement practices in many countries of Western Europe, IBM companies in the European business community decided that currently announced systems should continue to be marketed generally the same as those previously. For IBM customers in the 15 European countries, the new practices are scheduled to be effective July 1, 1972, for all systems and products.

As a result, except as related to System/3, the following will continue to be available without charge:

- Sales support and guidance to users of currently announced IBM systems on a mutually planned and scheduled basis.
- Present education courses relating to current products.
- Programs already in the program libraries will continue to be made available in the same prior manner.

CAI Lands California Education Deals

By Harvey Elman
CW Staff Writer

PALO ALTO, Calif. – The Information Sciences division of Computer Applications Inc. (CAI) has received two major contracts from the California Department of Education, according to Howard I. Morrison, division president.

The contracts cover computer software, or programming, to go with part of the California Education Information System (Ceis), a computer system being established to handle paperwork for local school districts through a state Dept. of Education program.

Employed in the system are an IBM 360 and a Honeywell 200.

Dan F. Smith, director of commercial systems for CAI, said the contracts cover payroll accounting, inventory reporting, accounts payable, and financial control programs, as well as student scheduling, guidance reporting, attendance accounting, and test scoring.

The cost of the two contracts was not disclosed.

The Ceis system is being designed to allow administrators and educators to work more efficiently by freeing them from certain duties. The system will be available from the Dept. of Education for use by California school districts during the 1970-71 school year.

The system, on a strictly voluntary basis, is being used for approximately one million students or 23% of California's total student enrollment, according to Robert Howe, Ceis coordinator.

Exclusive MDS Marketing Agreement Dissolved by Colorado Instruments

BROOMFIELD, Colo. – "Insufficient support and failure to sell the necessary amounts of our products" has forced Colorado Instruments Inc. to dissolve an exclusive marketing agreement with Mohawk Data Sciences (MDS), Herkimer, N.Y., according to John Zisch, Colorado Instrument marketing vice-president.

Non-Exclusive Basis

MDS will be retained on a non-exclusive basis to sell Colorado Instrument's data collection terminals and time-attendant stations in its reported $50-million market.

"Our seven regional centers, in operation only a few months, have sold more of these products than MDS has in two years," added Zisch.

The multimillion dollar business of MDS is built largely on an invention patented early this year.

The device, designated the Data-Recorder, enters information on magnetic tape for direct introduction into a computer. It eliminates the steps of first recording the data on punch cards and using a separate machine for verification.

The Data-Recorder was marketed in 1965.

Honeywell Keyboard Entry Called '2 Years Too Late'

By Phyllis Huggins
CW West Coast Bureau

LOS ANGELES – A new dimension has been added to the keyboard-to-disk business with Honeywell's Products Division's entry into the field with the Keyplex system.

James Sweeney, president of Computer Machinery Corp., which has more than twice as many keyboard-to-disk units in the field as the combined total of its competitors, commented on the changed aspects of business which could be expected by having a major manufacturer as a competitor for the first time.

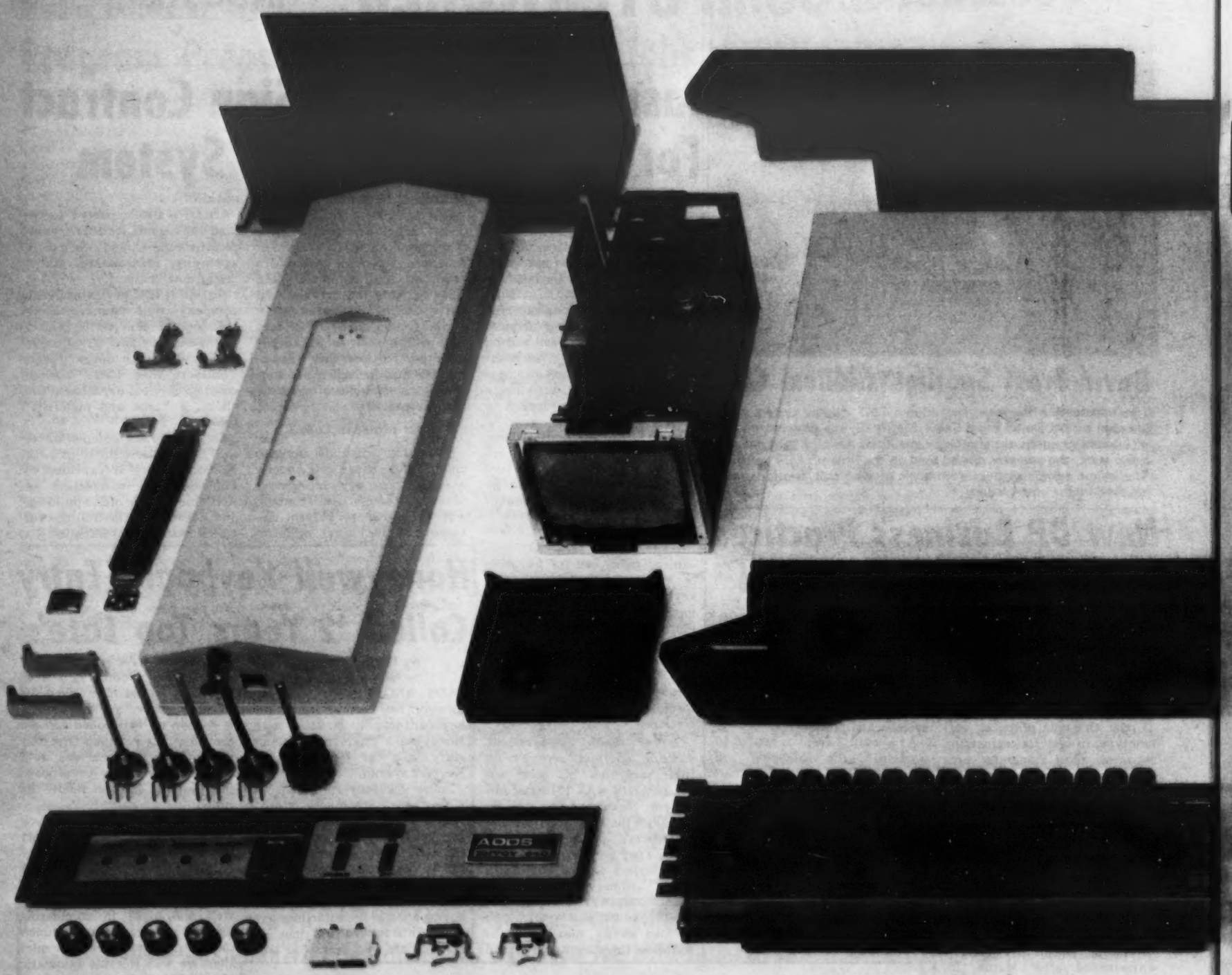
"They are two years too late. They should have been in it long ago. If they'd come in a year ago, they would have killed us. Actually, we've got more of a lead than we had hoped for. By the time they get their first unit working on a customer site, we'll have two hundred Keyprocessing systems in the field," he noted.

The main thing that holds back key-to-disk sales, he said, is user inertia and unwillingness to do any reprogramming. Undaunted by Honeywell, Sweeney said that with its large sales force, Honeywell will assist in stimulating users to change from keypunch methods. "They'll get more sales than we will. It's just axiomatic that with more salesmen you bring in more sales. However, they'll also be doing a lot to create more user awareness. Having Honeywell come in just proves that we were right. Heck, we invented this thing. It's an absolutely perfect system functionally."

Competitive Pricing

When it was pointed out that pricing seemed to be directly competitive (both systems have an average purchase price of $150,000), Sweeney said: "We don't know that, yet. It depends upon how much of their performance requires options at a price. However, we certainly aren't about to cut prices. If anything, we'll raise them."

Computer Machinery purposely selected the key-to-disk field as one in which a small company could support as effectively as a large one. It markets only in major cities and only to large-scale keypunch or key-to-tape users. This means that both sales and maintenance support can be supplied at full strength. "A major manufacturer doesn't make that much difference. I'll bet that if you looked into their organization, you'd find that they have the same number of guys working on software as we have."



How to build a portable CRT terminal.

Electronics. We tend to take these for granted because when we made our portable we took the guts right out of our MRD-200 readout display. You may have a problem here.

A piece of cake. First, you establish your goals. You want a full-scale computer terminal that pluge into an ordinary outlet, uses an ordinary telephone and has full editing controls. You want it to be simple, quiet, rugged, fully compatible with Teletype* systems and you want to be able to carry it easily. Also, you need one model that will display 512 characters and will sell for about $3200; another model that will display 1024 characters and will sell for about $3700.

Don't despair. We know it can be done. Here's what you need:

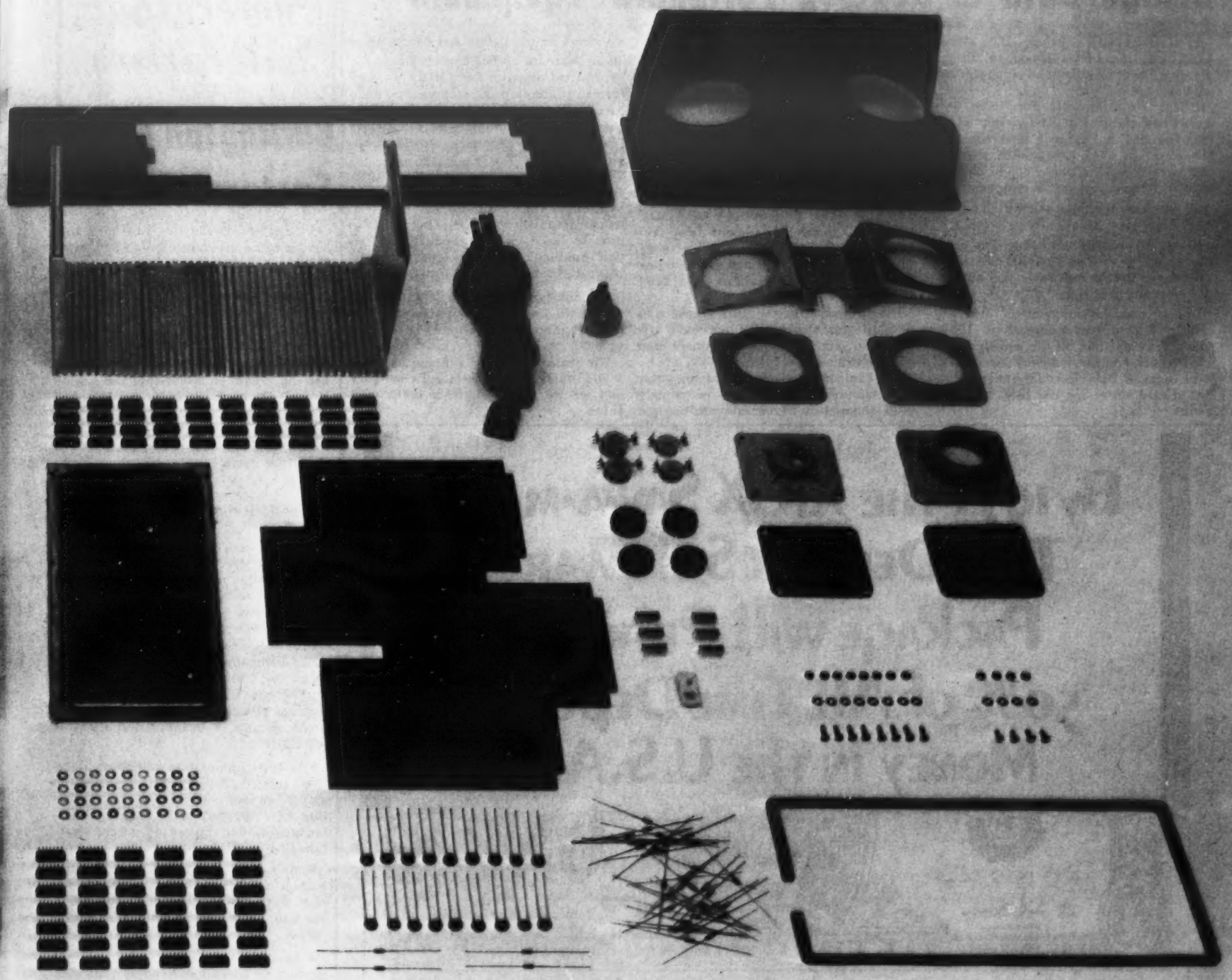
An acoustic coupler that is 10 times better than anything around—one that can operate on 40 dB attenuated lines in half duplex. You'll have trouble finding this because we're the only one who makes it. Also, you'd better use complete acoustic shielding because your terminal is going to be used in a lot of noisy places.

Now you'll want a CRT. Get a proven commercial TV monitor. It will buy you a lot of reliability and let you use TV raster techniques which make for sharp, legible characters. You might also consider using black characters on a light background and a page format for display. Both drastically reduce eyestrain.

Then you'll need a heavy duty keyboard, because the terminal is going to be taking a pounding. So find one that is solid state, rugged and can take extremes of temperature. Better buy the best available.

Suppose you drop it in a puddle. This is not recommended, but no matter. The frame is all of cast magnesium parts. It's fully gasketed and weatherproofed. There's a scuff-proof vinyl finish on the outside. The keyboard travels on jam-proof nylon bearings. Circuit boards float on foam pads and are clamped into a locked position.

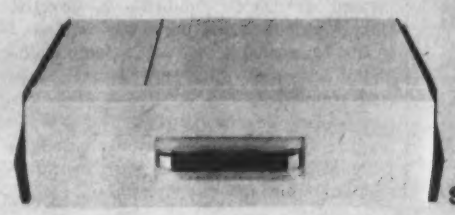
*Registered trademark of Teletype Corporation



Piano movers need not apply. After you put all these components together in a self-contained carrying case, your terminal will weigh 30 pounds and will measure 6" x 17" x 22". You can slide it under your airliner seat.

So who needs it anyway? That's what they said about the telephone. Nobody needs it or everybody does, depending on your viewpoint. Take the traveling salesman who sells from inventory. Consider what remote, mobile access to a computer would do for him for checking credit, inventory and closing an order on the spot. Then, there's the scientist working in the lab, the engineer at the construction site, the programmer working at home, the time sharing salesman.
And on and on. A lot of people would use your portable terminal. If you can build one.

ADDS
Applied Digital Data Systems, Inc.



See a demonstration at SJCC.

Mr. Richard Kaufman, Dept. 30
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Please send me more information about your portable terminals—the Envoy-600 and the Envoy-640.

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Bridge Data to Develop Peripheral Equipment

PHILADELPHIA – Bridge Data Products, Inc. has been formed to design, develop, and manufacture computer peripheral equipment.

Bridge Data Products, Inc. is an outgrowth of the former Bridge, Inc. which was founded in 1935 as a small tool and die shop. In 1945 it expanded into the engineering field. Since then, Bridge has gained renown for its developments in armaments, aerospace, electronics, and automation.

Bridge is presently introducing a card reader for processing the IBM System/3 96-column card as well as the conventional 80-column card types.

Design and development of its new multicard card reader started in 1969. Patents are pending on the new desk-top card reader, and the company is presently developing a data recorder (keypunch), and a card sorter for the IBM System/3 card.

Other Companies

★ Dacon Corp. has been formed to offer a wide range of technical services in such areas as publishing, direct mail promotion, information retrieval and reporting, inventory control, and software marketing..

Dacon, located in Cherry Hill, N.J., will provide assistance to smaller business firms as well as large companies.

★ Software Engineering Associates, Inc., (SEA), an independent firm specializing in the development of software for time-sharing systems and other on-line data processing applications, has been formed.

The firm said that it has a contract to develop time-sharing and software systems for an advanced equipment and communications complex.

The company anticipates that computer manufacturers and users will increasingly avail themselves of outside professional assistance in the design and development of software for on-line applications.

★ Micro Computer Inc. (MCI) has been formed to develop and manufacture dedicated computerized systems which have been configured around the proprietary low-cost, general-purpose micro computer.

The company was founded in April, 1969 and started operation in July, 1969 in Reseda, Calif. MCI recently moved to its current facility in North Hollywood to provide space for the production of its first product, a computerized numerical control (N/C) system for machines.

★ Omnicomp Computer Corp., Santa Ana, Calif., a recently formed company, plans to announce the Omnus-1 computer in May.

The basic Omnus-I system, including 4,096 bytes of magnetic core memory, will sell for under $4,000 in OEM quantities.

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CONTACT:
Ted Dela Court, Vice President
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119 N.E. 79th Street,
Miami, Florida 33138

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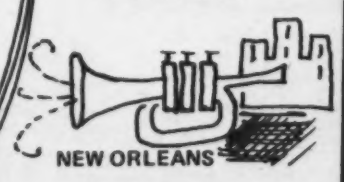
NEW ORLEANS

TOMORROWS SOFTWARE

emerging enterprises

Burlington Forms Systems Branch

CHICAGO – Burlington Northern Inc. has formed a new subsidiary to be known as Burlington Data Services, Inc.

The new subsidiary provides systems and programming for business concerns as well as its parent company.

Wilbur K. Bush, president of the subsidiary, said the company provides technical assistance in developing teleprocessing and computer techniques and a wide variety of batch program applications. Also, the firm will offer hardware time sales for its 360/40 and 50 equipment.

Bush said the firm was prepared to undertake facility management activities as well.

Other Subsidiaries

★ International Computer (Holdings) Ltd. (ICL) and Barclays Bank Ltd. have reached an agreement in principle to set up a joint computing bureau service.

The joint company will combine ICL's wholly owned bureau subsidiary, International Computing Services Ltd. (ICSL) and Barclay's Customer Services Division.

The company will provide a complete range of computing services including payroll, stock control, sales analysis, invoicing, general accounting, and a comprehensive set of technical and scientific applications.

★ A new computation and communication service department, designed to strengthen and improve corporate utilization of computers and communications facilities around the world has been established by Gulf Oil Corp.

Robert Scott, former director of information services for the corporation, has been named to head the new department. He will be in the Pittsburgh executive offices.

★ Sanders Associates plans to form a subsidiary company, Sanders Data Systems Inc., for its fast growing electronic data processing and communications business.

Subsidiary formation is the most far-reaching move Sanders has taken since beginning a major commercial diversification program three years ago. All major commerical acitivities will be consolidated into a single operating entity.

★ A visual display products group has been formed by the Consumer Products Division of Motorola Inc.

The new product group will be responsible for the development and marketing of a complete line of monochrome and color CRT display units to be used in computer terminal and closed circuit television applications.

A primary function of the group will be to supply CRT data terminal manufacturers with complete video display units.

The consumer products division's close circuit television display line will be marketed through Motorola's communications division.

★ USM Corp. has established an information technology department.

Based at USM's facilities in Beverly, Mass., the new department was conceived to make available use of a large-scaled digital computer and appropriate software support.

Its initial development is the factory loading system, which matches actual or planned work loads to a plant's productivity capability.

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Lithonia Lighting Orders New IBM Audio Terminals

CONYERS, Ga. – Lithonia Lighting, a division of National Service Industries, has ordered 205 of the new IBM 2721 portable audio terminals.

To accommodate the terminals, the company will add a "voice-answerback" unit to the 360/40 installed at its headquarters here. This device translates electronic impulses from the computer into spoken words, using a prerecorded stored vocabulary.

Lithonia agents will use the units to key in orders, check on the production status of products previously ordered, and determine stock status of warehouse items.

The firm's 23 warehouses also will employ the new terminals to update computer-held records of such transactions as receipt of new products and release of stock from inventory to the field.

Orders and Installations

Four firms have installed Honeywell Series 200 computers for insurance applications. Columbia National Corp. has installed a Model 110 magnetic tape system; Home Mutual Life Insurance Co., a Model 125 magnetic tape computer system; Midwest Mutual Life Insurance Co. of Des Moines, Iowa, a Model 110 magnetic tape system; and Richmond Life Insurance Co. of Richmond, Va., a Model 120 magnetic tape system.

California Computer Products, Inc., Anaheim, Calif., delivered its first disk drive/controller system (IBM 2314 equivalent) to Orange Coast College District Computing Facility, Costa Mesa, Calif.

The University of Delaware's $1.8 million order for a Burroughs B6500 is a major step in expansion of the university's data processing capabilities.

Canadian Overseas Telecommunication Corp. of Montreal, Canada, has ordered two Univac 418-III systems valued at $1.4 million. The complete system will include 16 Uniscope visual display terminals that will be located on site.

Eastern Airlines is planning to add a variable anamorphic motion picture system to its L-1011 flight simulator in order to achieve better simulation of actual flying conditions. The system, designed and built by the Singer Co. of N.Y., responds to both pilot maneuvers and computer-ordered situations.

One of the largest computer systems in Italy, a Control Data Corp. 6600 valued at $3.4 million, has been installed at Bologna University. Three other Italian universities, Florence, Venice, and Padua, will gain access to the computer with Control Data 200 user terminals plugged into the central system via telephone lines.

The Western Division of McDonnell Douglas Astronautics Co. is installing a CDC 6500 valued at $4.8 million.

CTC Computer Corp. of Palo Alto, Calif., is installing an IBM 360/40 to upgrade its on-line hospital system.

Ampex of Canada Ltd. has received an order from the Canadian Broadcasting Corp. to design, manufacture, and install a $2-1/4 million television production and network terminal system. The system will permit the eventual provision of fully automated control and routing of all terminal and network broadcasting functions of CBC's Montreal operations complex.

Scan-Data Corp. has received an order for a three-year lease on a Model 200 multifont OCR page reading system from Industrial Nucleonics Corp., Columbus, Ohio. Scan-Data also delivered a Model 200 system to Scanforms, Inc. of Philadelphia and a Model 300 to its Scan-Data Center in Detroit.

The Uni-card Division of Chase Manhattan Bank, New York, has ordered two System Seventy extended computing systems from Mark Computer Systems of Plainview, N.Y. The system, which will be installed in Unicard's new Lake Success facility, will be used for on-line data entry and file inquiry into Unicard's IBM 360/50, supplanting many current manual and machine data collection methods.

Order Backlog Forces Redcor Expansion

WOODLAND HILLS, Calif. – Redcor Corp., manufacturer of computers, test systems, and electronic and computer components, has moved to a 60,000-sq-ft plant here.

Expansion from the original Canoga Park facility was due to the rapidly increasing order backlog. New hirings have brought employment to 525, more than doubling the level of June, 1969.

Redcor, founded in 1957, grew to its present size and financial and technical strength in the 37,000-sq-ft plant on Deering Avenue in Canoga Park.

It was there that the RC 70 midicomputer was designed and manufactured. Another vital area of growth has been in the development and marketing of Redcor's MOS microcircuit tester.

The new Woodland Hills facility is at 21200 Victory Blvd., Woodland Hills.

Expansions

Other Expansions

Computran Co., Detroit, Mich., has begun construction of a $1 million data center at Big Beaver and Livernois in Troy. Located on a three-acre site, the center will contain 60,000 sq ft and will employ more than 200 when it opens.

Data Action Corp. of Minneapolis, Minn., has opened a branch office in Dallas, Texas, at Exchange Park, Suite 216, Braniff International Tower, and in San Francisco at Suite 750, Crocker Plaza.

Keystone Computer Associates, a subsidiary of University Computing Co., is forming a branch office in Cleveland. Keystone maintains its corporate office in Fort Washington, Pa., with branch offices in four other major metropolitan areas: Boston, Chicago, New York, and Washington, D.C.

Computech Research, Ltd., Tucson, Ariz., has broken ground for two buildings in the W. Grant Road Industrial Park to increase operating space from 6,500 sq ft to 12,000. Computech plans to use one building as a computer center and the other for offices.

Intranet Computing Corp. has extended its proprietary time-sharing service to the Denver area by opening a sales and applications center in the Denver Technological Center in Englewood, Colo., a Denver suburb.

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City-County Government. Supervise third generation Burroughs computer center, recommended long range planning, including consolidation of small installations into data center. Government application, including budgetary-financial, utility billing, taxes, medical. Should have a degree in Business Administration with five years experience in Data Processing managerial level. Salary Range $15,000 – $20,000. Send resume to Mr. Sigfrid Pearson, Director of Central Services, City of Jacksonville – City Hall, 220 E. Bay Street, Jacksonville, Florida.

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General Automation Reveals Backlog, Buys ERA to Expand European Market

By Phyllis Huggins
CW West Coast Bureau

SANTA ANA, Calif. – A significant expansion of international operations and a steadily growing backlog were announced by General Automation, Inc., a leading developer of computer-based systems for automated manufacturing and other industrial applications.

Lawrence A. Goshorn, president of General Automation, announced that the company has further broadened its penetration of the European market through the acquisition of Elektronische Rechenanlagen Gmbh (ERA).

ERA, based in Aachen, West Germany, develops computer-based systems for automated manufacturing and scientific data acquisition.

ERA has more than 200 active customers in West Germany, the UK and the Scandinavian nations, Goshorn stated. Among these customers are most of the continent's largest automobile, steel and electronics manufacturers.

The acquisition was made for an undisclosed amount of cash and General Automation common stock.

Goshorn further disclosed that General Automation's backlog has risen to a high of more than $6 million, up from less than $1 million a year ago. While production has been increasing as a result of the demand for General Automation computer systems, the backlog continues to grow, Goshorn said.

"We are particularly gratified by the fact that the bulk of our backlog now consists of orders from companies in the Fortune 500 group, including the nation's largest automobile, electronics and communications manufacturers," Goshorn said.

Most of these orders are for complete computer systems, which incorporate software, or programming, as well as computing equipment, Goshorn explained. Profit margins are higher on such complete systems.

In addition to a growing line of computers, General Automation manufactures a broad line of minicontrollers. These are the devices which connect computers with manufacturing equipment, with other computers, and with communications equipment.

General Automation markets its systems through a growing network of sales offices in the United States and abroad. The company's sales organization is supported by a service group which provides systems design, systems engineering, programming, system implementation, and training for a broad range of customers.

Trade Shorts

Cybercom Corp., manufacturer of computer peripheral equipment, has appointed two district managers to head its newly opened offices in New York and Chicago.

Nicholas T. Margopulos has been named New York regional sales manager, and Donald V. Barry has been picked to be Chicago regional sales manager. Both men have an extensive EDP background.

Micro Image Corp., San Diego, Calif., a computer output microfilm (COM) firm, has acquired the exclusive rights to a laser beam deflector patent.

The patent is held by Joseph T. McNaney, father of the COM industry and inventor of the Charactron tube used in the Stromberg Datagraphix COM recorders. His development of a laser beam deflector, which is capable of direct imaging on light sensitive film, reportedly has the potential to eliminate the wet-bath processing presently used, thus moving COM operation significantly closer to a true computer environment.

Union Carbide Corp. has been selected to develop a unique electro-optic crystal for use in the laser recorder microfilm system.

The Smith-Corona Marchant division of SCM Corp., New York, has formed a new industrial products department to expand its position in the OEM market, according to Arthur D. Hall, R&D and Systems Engineering vice-president.

The department, created to meet the growing demand for office machine products, will operate from the SCM Melabs facility in Palo Alto, Calif.

RCA Corp., New York, and the Farrington Mfg. Co., Springfield, Va., have signed a non-exclusive agreement by which RCA will offer Farrington's line of optical character readers as peripheral equipment for use with its Spectra 70 computer line.

The agreement covers certain Farrington page readers, document readers, and journal tape readers.

Realtronics Inc., Paramus, N.J., a subsidiary of Cybernetics International, is installing R1 key-to-disk data entry systems, which speed the preparation and processing of stock transfer information, and handle input needs.

A new data center, Computer Utilities of Dallas, has been formed as part of an extension of the nationwide system of Western Union Computer Utilities.

The company said the service used a "simple, low-cost" approach to providing bookkeeping and reporting needs of businessmen and offers a broad range of packaged programs.

The Houston-based National Sharedata Corp. has signed a letter of intent with Computer Data Inc. for the Tokyo firm to develop its services in Japan and throughout the Asian Pacific area.

National President Daniel B. Stuart said that this is one of the first such arrangements providing computer management services in Japan.

National, through Computer Data, intends to develop a complete bank computer services program to be marketed in Japan. There are now 358 banking computers in Japan valued at $153 million.

General Mills, Minneapolis, has constructed a new wing at its Golden Valley headquarters to house its computer in "comfort." The company has provided the computer with its own "heater." A self-heating glass by PPG Industries is designed to help maintain the precise controlled environment required by the computer's delicate electronics circuits.

National Software Exchange, Great Neck, N.Y., has agreed with Western Systems Inc., Salt Lake City, to market Western's dynamic multi-tasking system (DMTS), a software package designed to increase the throughput of both the CPU and peripherals of IBM 360s under DOS.

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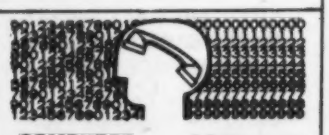

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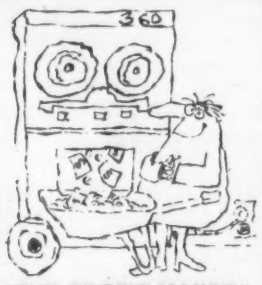

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Contracts

Budget Rent A Car Corp. of America, (the car-rental service of Transamerica Corp.) has been contracted by Telemax Corp., a subsidiary of Wellington Computer Systems, Inc., for its computerized reservation system.

Redcor Corp. of Woodland Hills, Calif., and Computer Instrumentation, Ltd. (a subsidiary of University Computing Co.) have agreed for Computer Instrumentation to manufacture the RC-70 and Redcor's line of instrumentation products. The five-year contract was valued in excess of $1 million.

The Bank of Finland in Helsinki has contracted with the Finland Univac Division for two Univac 1108 multiprocessor computer systems, valued at $4.4 million. The contract was made by the Bank of Finland on behalf of Sitra, the Finnish Independence Jubilee Fund, to commemorate Finland's 50th year of independence. The Fund was established to further the nation's economy through research and education.

Midwest Stock Exchange Service Corp. has reached an agreement with Sycor Inc. under which Sycor video terminals will be used for order entry by brokerage firms across the country. The terminal configuration includes two teletypewriter printers for hard copy configuration of all message traffic from the branch office to the exchange floors, or over-the-counter dealers, and will operate in full duplex mode in the conventional securities 75 baud system.

Computer Retrieval Systems, Inc. of Bethesda, Md., has received a contract to design, develop, and implement a model automated criminal court management system for the U.S. District Court. Funded by the Federal Judicial Center, the contract will provide data on current status and disposition of all cases and defendants handled by each of the criminal court judges through June, 1970.

Itel Acquires Intercontinental Systems

SAN FRANCISCO – Itel Corp. and Intercontinental Systems Inc. shareholders have approved previously announced terms for Itel to acquire Intercontinental Systems through an exchange of stock.

Terms for the acquisition call for Intercontinental shareholders initially to receive 0.2 share of Itel common stock for each Intercontinental share held, with the possibility of up to 0.8 additional Itel shares based on Intercontinental's 1970 earnings. Currently, Intercontinental has 2.1 million common shares outstanding.

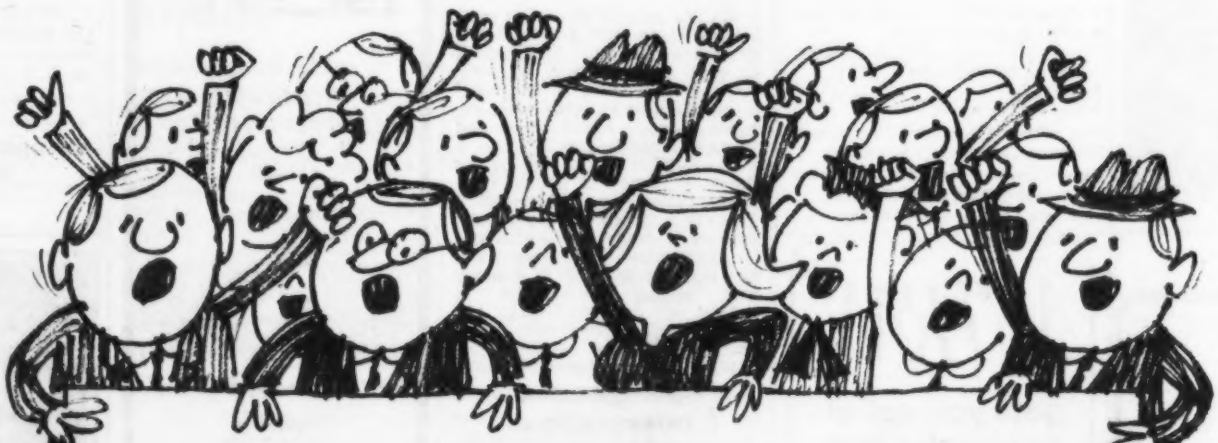
Itel, based in San Francisco, is a data processing and leasing concern. The company, formed earlier this year by the merger of SSI Computer Corp. and Statistics for Management Data Processing Corp., is 40% owned, on a fully diluted basis, by American Express Co., New York.

Acquisitions

Real Time Computer Systems, Inc. has agreed to acquire three soft drink bottling plants from **Wriking Food/Beverage Systems, Inc.** and four outdoor advertising companies from **Gregg Industries, Inc.** Real Time will exchange 200,000 shares of stock for these companies. The bottling plants include: Coca-Cola in Des Moines, Seven-Up and Canada Dry in Denver, and Canada Dry in Phoenix. The advertising companies include: Big-Tenn Outdoor Advertising, Inc., and Mid-States Communications Corp., which owns two outdoor companies.

Computer Sciences Corp. (CSC) has acquired **Commonwealth Services Inc.** of New York for an undisclosed amount of CSC common stock. Commonwealth Services Inc. provides engineering, architectural, and management consulting services to the public utilities industry, and to organizations in the fields of transportation and industrial processes.

Arcata National Corp. has acquired **Communications Consultants, Inc.**, San Francisco; **Westcom Corp.**, Los Angeles; **Tele-Dynamics, Inc.**, Seattle, and **Phone Consultants, Inc.**, New York. Arcata has also reached agreement in principle to acquire **National Communications Planning Service, Inc.**, Chicago; and **Phone Consultants, Inc.**, Miami. Terms of the transactions were not disclosed.



Atlantic City Will Be Wall To Wall People

Don't let your prospective customers get lost on the floor

Spring Joint this year, May 5, 6, 7 in Atlantic City, New Jersey, has got to be the biggest ever. More customers, more visitors, more exhibitors (bigger than FJCC – Las Vegas, if you can believe that).
COMPUTERWORLD, as always, will be right on top of it with 2 Special issues.

In addition to mailing to our over 34,000 paid subscribers, we'll distribute 7,000 bonus copies of each of these important latest news issues to Show attendees.

SJCC Preview issue – Advertising forms close April 17
Color forms close April 10

SJCC Show issue – Advertising forms close April 24
Color forms close April 17

Why let that eager customer wander. He might fall into the enemy camp. Control the crowd and make sure your prospects see your exhibit and talk to your salesmen. Advertise in either one. . . or. . . Both of these issues.

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Issue Date	Closing Data	Color & Insert Closing Date
April 15	April 3	March 27
April 22	April 10	April 3
	SJCC PREVIEW ISSUE	
April 29	April 17	April 10
	SJCC SHOW ISSUE	
May 6	April 24	April 17

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NASD Quote System on Schedule

By Harvey Elman
CW Staff Writer

TRUMBULL, Conn. – The National Association of Securities Dealers (NASD), an overseer of trading in the OTC stock market, plans to have its automated quotation system on-line late this year as originally scheduled [CW, Jan. 1, 1969].

The association's automated quotations computer system, designated Nasdaq, is designed to give the public its first real look at over-the-counter activity, assuring truer price quotes and an accurate measure of how much stock is changing hands.

"We're convinced that with the new system will come a tremendous growth in the over-the-counter market," said John H. Hodges Jr., NASD vice-president.

The heart of the system, being put together by Bunker-Ramo Corp., Stamford, Conn., business and industry division, at a cost of $21 million, is two Univac 1108s. When the system starts up, about 3,000 terminals will be installed in about 1,100 brokerage-house locations throughout the country.

Using these terminals, these brokerage-house "market-traders" need only punch a few buttons to obtain a reading in three or four seconds on stock prices, according to a Bunker-Ramo spokesman.

The market-traders, numbering at least 500 in Bunker-Ramo's estimate, will use the desk-top terminal to put into the Trumbull computer center what prices they are offering to pay for the stocks they deal in, and at what prices they are willint to sell them.

What they're doing is replacing the telephone as the main instrument in over-the-counter trading.

Previously, an OTC market-maker, to get the best price in any deal, has used the telephone to call at least three other brokerage-house market-makers to check prices on a stock.

That's where Nasdaq comes in. A list of the prices at which each market-maker is willing to buy or sell a given stock is available by button-pushing. One list will be in order of the highest bid; the other of the lowest asking price.

Initially, 3,000 issues will be quoted daily, said Bunker-Ramo. OTC retailers will then be able to view median quotes on a single issue with the use of one of 3,000 CRT terminals, designated the Tele-Quote III.

As each market-maker changes his quotes, he tells the computer, so the prices on the list are constantly kept up-to-date. At the end of the day, each market-maker will tell the computer how many shares he's traded that day. For the first time, volume statistics can be kept on OTC stocks.

Honeywell H-516 concentrators, for message-switching and funnelling of data, will be employed in six major cities throughout the nation to reduce delays and errors in the system.

OCR-Maker Farrington Predicts $2.5 Million Deficit for 1969

SPRINGFIELD, Va. – Farrington Manufacturing Co., one of the leading makers of optical character reading equipment, has revealed it expects a loss of more than $2.5 million for 1969.

On the positive side, though, trustees of Farrington's $3.7 million subordinated debenture agreed last week to give Farrington more time to find new financing. The debenture was due early last week.

Farrington said its loss came "principally as a result of significant inventory adjustments and differences revealed during the year-end financial closing now being audited."

The company added that it began to use a new computerized inventory accounting system last year, and that it is trying to discover the causes of "the inventory discrepancies."

In 1968, the company earned $325,000, or six cents a share. Sales for 1969 rose to about $33 million in 1969 from $30.6 million in 1968. Farrington had reported for the first nine months of 1969 a net loss of $227,000, including $130,000 from devaluation of the franc.

Audited figures for the full year 1969 won't be available until May, according to the company.

Farrington management met last week with representatives of its major creditors and trustees of its 5-1/2% convertible subordinated debenture to "discuss its debt repayment schedule."

At the meeting the debenture trustees agreed to let Farrington default on its repayment for an indefinite period. They stipulated that management keep in close contact.

Though a Farrington spokesman refused to speculate on how long it would be until the company found new financing, he said the company "hopes it is very quickly."

Robert DiComes on Stocks

Is Now the Time to Buy?

With general bearish news having been the daily fare for investors, the adage "caveat emptor" prevailed for those entering a market fraught with major crises. The lack of positive good news and only speeches and promises do not a better market make.

The reaction of a nervous buying public to any parcel of good news manifested itself two weeks ago last Tuesday when the buyers jumped at the hint of a possible solution of the postal strike. Up 10 points! Come now! The market is made of firmer stuff. Follow this item with a cut of 1/2% in the prime rate by the Irving Trust and the market took off.

Market commentators cited the flights of the glamor issues and the passing through (inter-day) of the 800 mark in Dow-Jones averages. But now let us pause; should this be read as a turning-point or must we look further into the underpinnings of this market?

Ultimately, the first premise of supply and demand holds sway. Institutional money sits on the sidelines and buys in very cautiously; the bears scream recession; bond issues are held back for better days: who would dare to buck this trend? Add to this the heartening news that industrial output in February slipped to a new 13-month low! Can one venture into this market now?

For the record, we say *yes*! But only by adding up the following positive factors: the current decline is the longest since 1961-62 (not *apparently* a major factor, but since the market is not a

(Continued on Page 50)

Robert DiComes of Cambridge, Mass., will be commenting for CW from time to time on the stock market aspects of the computer industry. Educated at Harvard, DiComes is a retired broker who spends his time managing his real estate in Boston, his own stock portfolio, a farm in New Hampshire, and writing a bridge column for a Boston newspaper.

DiComes and his assistant, Robert Morley, maintain charts and in-depth analyses of most stocks in the computer industry.

While CW is not a securities broker, and does not endorse any of DiComes's recommendations, we hope his commentary will prove interesting to our readers.

Unnamed Banker May Save Com-Share

ANN ARBOR, Mich. – Com-Share, Inc., which was unable to pay a $500,000 debenture due Feb. 28, has reached an agreement in principle with a "prominent investment banker" on a new financing plan.

Holders of the debenture had extended the due date of the debenture to May 31.

Com-Share President Robert F. Guise Jr. refused to discuss the details of the new financing arrangement, and said the plan was subject to certain contingencies. Guise declared that he was "optimistic that all of the contingencies could be met and that the financial plan would become operable within the next two weeks."

Guise did say that the agreement would include a loan, recollateralization of another loan, and a sale and leaseback agreement on "some equipment we own."

For the six months ended Dec. 31, Com-Share had operating losses of about $1,754,000, compared to losses of $1,177,000 for the same period in 1968. Revenue increased to $2,147,000 from $1,159,000.

Guise had announced previously that the company was seeking new money from the sale of stock or convertible debentures. His latest announcement made no mention of equity financing.

IBM Gives Levin-Townsend Extra Month

NEW YORK – IBM has given Levin-Townsend a further extension on its overdue debt of $11.2 million.

IBM had delayed to March 17 action on the debt with the provision that the deadline could be extended if Levin-Townsend were engaged in "good-faith negotiations" to obtain further financing. IBM has extended that deadline to April 17.

Levin-Townsend had announced that it was seeking $20 million in private financing to pay the IBM debt, certain other debts, and increase cash flow. The company's total commitment to IBM is $47.3 million through 1972.

According to James E. Townsend, president of the company, Levin-Townsend is still negotiating for the necessary financing.

The computer leasing company has had hard times in 1970. Howard S. Levin announced he would wage a proxy fight to regain control of the company. He was dismissed by the Levin-Townsend board in mid-January. The company is also in a tight cash situation, and reported a $15.8 million loss for the latest nine months, due to writeoffs of bad investments of nearly $20 million.

Hotel and Casino

Of these writeoffs, $10 million was accounted for by the Bonanza Hotel and Casino in Las Vegas. Levin-Townsend recently closed the casino and cut back operations at the hotel. The company reported it was negotiating with a group of Canadian investors to sell the Bonanza.

According to a suit filed by Levin against the Levin-Townsend board, the company has received an offer of $8 million from the Canadians for the Bonanza.

Data Sciences Division Losses Revealed by URS

BELMONT, Calif. – Earnings of URS Systems Corp. for fiscal 1970 will be lower than in 1969, according to Richard DeLancie, president of the company.

DeLancie blamed the drop on "losses in the data sciences division."

For the fiscal year ended Oct. 31 the diversified planning and systems engineering firm earned $1.4 million, or 71 cents a share, on revenues of $26.4 million.

DeLancie made his announcement at the annual shareholders meeting, where holders voted to increase the number of authorized common shares from three million to five million. Holders also agreed to reducing the size of the board of directors from 11 to seven.

The company said the data science unit was "in a period of retrenchment."

Charles Caldwell, who heads the division, noted the "current widespread agonies in the computer industry." According to Caldwell, "We learned the lesson of running a little too hard too fast."

Data Systems Analysts, Inc. Says 1969 Sales Up 29%, Net Up 113%

PHILADELPHIA – Data Systems Analysts, Inc. has reported record 1969 sales and earnings.

Robert E. Wallace, president of the Pennsauken, N.J., computer programming firm which provides a variety of data communications services, revealed that sales revenues rose to $2,073,773, a 29% increase from $1,612,957 in 1968. Net income spurted 113% to $81,224, or 11 cents per average share outstanding, from $38,130, or six cents per share in 1968.

Wallace noted that the earnings increase was due to a number of factors, including a continuing increase in volume of data communications programming services, maturation of a subsidiary to a profit status, and a tightening of cost controls.

One of the year's most significant accomplishments, he added, was the completion of a program for a system which handles communications data for more than 100 airlines throughout the world.

Add Up the Positive Factors Before Entering Market

(Continued from Page 49)

computer, human psychology must prevail); the short interest rate on the New York Stock Exchange is the lowest since February, 1967; March auto production indicated a rise from the depths; housing starts are seasonally higher; certain banks have broken the price barrier on short-term interest rates; mining and utility output is on a gradual increase; steel production has risen for the last two weeks; odd-lot trading (a major force to many point and figure chartists) shows sales greater than buys (presumably the little investor is always wrong); and, finally, commercial bank credit increased by $1.1 billion, after a $2.5 billion decline in January. Plus, world markets in London and Europe have reflected our present confidence by registering substantial gains in the prices of their equities in the past 2 weeks.

Near-Term Gains

At the moment of truth, with over 100 computer-oriented companies to pick from, what computer stocks should a man buy now for near-term gains? Accuse me of having been premature in a still uncertain market, but when this column was still in its birth throes, I bought myself a $10,000 paper portfolio of the following stocks (number of shares, market price at the close of business Monday, March 23, commissions reflected in the total cost). Any change of heart and selling of these issues will be reported every two weeks (plus performance percentage at current market prices). Market cost of the portfolio will be carried at 100% and bi-weekly market value will be figured from this base. I am hoping for a 40% appreciation in six months!

$10,000 Portfolio
(Priced At Close, 3/23, 1970)

Shares	Security	Price per share	Total Cost	Price and Value 3/30	
15	Digital Equipment	$93.50	$1,425	105-1/2	$1,605
50	Foxboro	37.00	1,875	39-7/8	2,018
50	Potter Instruments	36.38	1,825	40	2,000
50	Systems Engineering	34.38	1,735	37-1/2	1,885
10	Telex	120.50	1,235	133-7/8	1,370
50	Wang	38.13	1,950	43-1/2	2,219
			$10,045 @100%		$11,097 =110+%

Earnings Reports

SYSTEMS CAPITAL CORP.
Year Ended Dec. 31

	1969	1968
Shr Ernd	$.29	a$.18
Revenue	5,862,000	b2,679,115
Earnings	1,070,000	630,000

a-Adjusted to reflect two-for-one stock split in Feb. 1969; b-Restated by company to reflect change in accounting.

CUBIC CORP.
Year Ended Dec. 31

	1969	1968
Shr Ernd	$.77	a$.73
Revenue	35,665,000	28,986,574
Tax Cred	.....	36,077
Earnings	1,709,083	b1,502,283
3 Mo Shr	.18	.22
Revenue	11,310,263	8,627,359
Earnings	396,639	429,381

a-Based on income before tax credit; b-Equal to 75 cents a share.

COMPUTER APPLICATIONS INC.
Three Months Ended Dec. 31

	1969	a1968
Revenue	$10,152,000	$10,356,000
Spec Cred	b3,282,000	.....
Earnings	c1,093,000	d677,000

a-Restated by company; b-Gain on sale of 18% common stock of E.B.S. Data Processing Inc.; c-Equal to 68 cents a share; d-Loss.

RCA CORP.
Year Ended Dec. 31

	1969	a1968
Shr Ernd	$2.32	$2.37
Rev	3,221,679,000	154,743,000
3 Mo Shr	.69	.81
Rev	870,813,000	849,141,000
Earnings	44,520,000	52,158,000

a-Restated by company to reflect the acquisition of Hertz Corp., on a pooling-of-interests basis.

DATATRONIC RENTAL CORP.
Six Months Ended Dec. 31

	1969	1968
Shr Ernd	$.22	$.21
Revenue	1,520,991	1,371,239
Earnings	147,060	113,987

GOULD INC.
Six Months Ended Dec. 31

	1969	a1968
bShr Ernd	$1.61	$1.45
Revenue	174,912,000	175,689,000
bEarnings	7,783,000	7,019,000

a-Restated to reflect pooling-of-interests acquisition; b-Based on a 100% pooled basis with adjustments for interest charges in 1968 only.

TRACOR COMPUTING CORP.
Year Ended Dec. 31

	1969	a1968
Revenue	$5,194,725	.....
Loss	3,096,679	.....

a-Comparable figures unavailable; 1969 was first full year of operation.

DASA CORP.
Three Months Ended Jan. 31

	a1970	1969
bShr Ernd	$.10	$.07
Revenue	4,550,000	2,290,000
cTax Cred	225,000	148,000
Earnings	490,000	307,000

a-Includes operations of Cybertronics Inc., for seven weeks from acquisition on Dec. 18, 1969 and treated as a purchase; b-Based on income before tax credit; c-Reflects tax loss carryforward from prior years; d-Equal to 20 cents a share in 1969.

On a fully diluted basis, per share earnings were 20 cents in 1970 and 13 cents in 1969, after tax credit.

APPLIED DEVICES CORP.
Three Months Ended Jan. 31

	1970	a1969
Shr Ernd	$.08	$.01
Revenue	7,530,000	3,856,000
Earnings	176,000	10,000

a-Restated on a pooling-of-interests basis to reflect acquisitions.

COMPUTER TECHNOLOGY INC.
Year Ended Dec. 31

	1969	a1968
Shr Ernd	b$.26	.....
Revenue	32,665,000	.....
Earnings	b1,486,000	.....

a-Comparative figures are not available. The company was formed in Aug. 1968; b-Includes net income of Service Technology Corp. subsidiary of $456,000, or eight cents a share. Subsidiary was sold to LTV Aerospace Corp. Dec. 31, 1969.

FACTSYSTEM INC.
Year Ended Dec. 31

	1969	1968
aShr Ernd	$.13	.....
Revenue	588,820	$45,463
Spec Cred	b3,282,000	.....
Earnings	c1,093,000	d677,000

a-Based on income before special credit; b-Tax carry-forward credit of $52,000, less a $19,250 extraordinary charge as expenses on aborted debenture issue; c-Equal to 19 cents a share; d-Loss.

VIATRON COMPUTER SYSTEMS
Year Ended Oct. 31

	1969	1968
Revenue	$716,241	$72,131
Loss	9,471,615	1,254,351

Losses reflect expenses incurred in the startup of manufacturing operations, for design and production of its metal oxide semiconductor arrays, and other product development costs.

ELECTROGRAPHIC CORP.
Year Ended Dec. 31

	1969	1968
Shr Ernd	$1.96	$1.70
Revenue	38,619,168	38,754,843
Earnings	1,082,273	950,045

URS SYSTEMS CORP.
Three Months Ended Jan. 31

	1970	a1969
Shr Ernd	$.19	.....
Revenue	5,800,000	.....
Earnings	385,000	.....

a-Comparable figures unavailable.

SYSTEMS ASSOCIATES, INC.
Six Months Ended Dec. 31

	1969	1968
Shr Ernd (loss)	($.34)	$.04
Revenue	1,641,808	437,280
Earnings (loss)	(368,301)	34,914

INFORMATION INTERNATIONAL
Nine Months Ended Jan. 31

	1970	1969
Loss Per Shr	$.12	$.04
Revenue	820,034	717,414
Loss	285,514	91,567

SANDERS ASSOCIATES INC.
Six Months Ended Jan. 31

	1970	1969
Shr Ernd	$.06	.....
Revenue	84,800,000	$84,900,000
Earnings	265,000	d544,000

d-Loss

DEARBORN COMPUTER & MAR
Three Months Ended Jan. 31

	1970	1969
aShr Ernd	$.47	$.72
Revenue	9,473,000	5,942,000
Earnings	727,000	766,000

a-Based on average shares outstanding, including common equivalents. On a fully diluted basis, share earnings would be equal to 43 cents in 1970 and 61 cents in 1969.

MOHAWK DATA SCIENCES
Three Months Ended Jan. 31

	1970	1969
aShr Ernd	$.38	$.22
Rev	b25,880,000	19,940,000
Spec Cred	.....	c150,000
Earnings	2,060,000	d1,375,000
a6 Mo Shr	.70	.40
Rev	b50,835,000	35,730,000
Spec Cred	e275,000	c300,000
fEarnings	4,085,000	2,515,000

a-Based on income before special credits; b-Includes approximately $1,000,000 in the quarter and $2,000,000 in the six months from the sale of rental equipment to a third party concern; c-Tax credit; d-Equal to 25 cents a share; e-Gain on revaluation of foreign currencies; f-Tax equal to 75 cents a share in 1970 and 46 cents a share in 1969.

AUTOMATION SCIENCES INC.
Six Months Ended Jan. 31

	1970	a1969
Shr Ernd	$.25	$.14
Revenue	1,758,873	1,032,719
Earnings	280,659	139,793

a-Restated by company.

AMERICAN COMPUTER LEASING
Year Ended Dec. 31

	1969	1968
aShr Ernd	$.64	$.34
Revenue	5,688,414	2,937,741
Spec Cred	397,927	211,000
bEarnings	2,030,688	1,749,007

a-Based on income before special credit; b-Equal to 84 cents a share in 1969 and 46 cents in 1968.

OPTICAL SCANNING CORP.
Six Months Ended Dec. 31

	1969	1968
aShr Ernd	$.24	$.67
Revenue	4,747,477	4,496,875
Tax Cred	42,000	19,000
bEarnings	169,239	366,300

a-Based on income before tax credit; b-Equal to 32 cents a share in 1969 and 70 cents a share in 1968.

BALTIMORE BUSINESS FORMS
Year Ended Dec. 31

	1969	1968
Shr Ernd	$.92	$.80
Revenue	18,312,594	15,648,620
Earnings	675,000	576,922

LEAR SIEGLER INC.
Six Months Ended Dec. 31

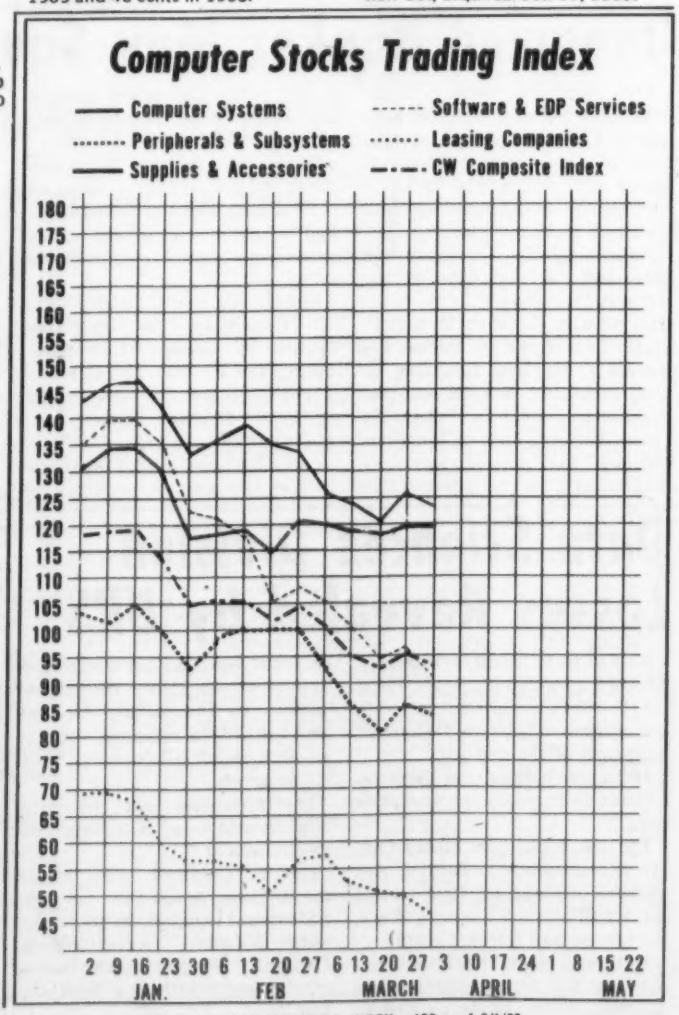
	1969	a1968
Shr Ernd	$.88	$.78
Revenue	283,076,000	281,086,000
Earnings	12,957,000	11,449,000

a-Restated on a pooling of interests basis to include Trousdale Construction Co., acquired Oct. 31, 1969.

Wild Index

Due to a keypunching error, last week's Software and EDP Services Index registered a dramatic if unearned 50% gain. This week's Index has been corrected to show the proper values.

Computer Stocks Trading Index



BASE FOR EACH TRADING INDEX: 100 as of 3/1/68

Computerworld Stock Trading Summary

NEW YORK AND AMERICAN STOCK EXCHANGE CLOSING PRICES, FRIDAY, APRIL 3;

OVER THE COUNTER, THURSDAY, APRIL 2

SUPPLIES & ACCESSORIES

EXCH	1970 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE
O	46- 35	45 1/4	ACME VISIBLE	- 3/4	- 1.63
N	15- 11	12 1/8	ADAMS-MILLIS CORP	- 1/4	- 2.02
O	21- 16	16 1/2	BALTIMORE BUS FORM	- 1/2	- 2.94
A	25- 12	13 1/8	BARRY WRIGHT	- 1/2	- 3.67
A	35- 27	27 3/4	DATA DOCUMENTS	- 1 1/2	- 5.13
N	19- 14	16 1/8	ENNIS BUS. FORMS	+ 3/4	+ 4.88
N	166-106	117	MEMOREX	- 1/2	- 0.43
N	114- 99	106 3/8	3M COMPANY	+ 3	+ 2.90
O	38- 34	37 7/8	MOORE BUS FORMS	+ 1/2	+ 1.34
N	43- 34	34 7/8	NASHUA CORP.	- 2 1/8	- 5.74
O	48- 42	44 3/4	REYNOLDS & REYNOLD	- 1/4	- 0.56
O	30- 26	28 3/4	STANDARD REGISTER	- 1/2	- 1.71
N	39- 33	35 1/2	UARCO	- 2 1/4	- 5.96
A	30- 15	18 5/8	WABASH MAGNETICS	- 7/8	- 4.49
O	41- 36	39 1/2	WALLACE BUS FORMS	- 1/2	- 1.25

COMPUTER SYSTEMS

EXCH	1970 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE
N	172-129	144 1/8	BURROUGHS CORP	- 2 7/8	- 1.96
N	37- 20	26 1/4	COLLINS RADIO	+ 1 1/8	+ 4.48
N	122- 52	52 1/2	CONTROL DATA CORP	- 4 3/4	- 8.30
A	124- 91	98	DIGITAL EQUIPMENT	- 4 5/8	- 4.51
N	11- 7	8 3/4	ELECTRONIC ASSOC.	+ 1/2	+ 6.06
A	14- 9	10 1/4	ELECTRONIC ENGINEER.	+ 3/4	+ 7.89
N	39- 30	37 3/4	FOXBORO	- 1 1/4	- 3.21
O	42- 24	25 1/2	GENERAL AUTOMATION	+ 1/2	+ 2.00
N	77- 67	74 1/4	GENERAL ELECTRIC	+ 1/8	+ 0.17
N	45- 43	44 7/8	HEWLETT-PACKARD CO	+ 1/8	+ 0.28
N	152-121	127 1/2	HONEYWELL INC	- 1/2	- 0.39
N	387-315	326 1/2	IBM	- 6 3/4	- 2.03
N	171-129	130 3/4	NCR	- 9 3/4	- 6.94
N	34- 29	30 3/4	RCA	- 1/8	- 0.40
N	33- 26	27 3/4	RAYTHEON CO	- 1 1/8	- 3.90
O	8- 2	5 1/2	SCI. CONTROL CORP.	- 1/4	- 4.35
N	40- 33	36	SPERRY RAND	- 2	- 5.26
A	49- 33	36 5/8	SYSTEMS ENG. LABS	- 5/8	- 1.68
N	29- 22	22 3/4	VARIAN ASSOCIATES	- 2 1/8	- 8.54
A	51- 36	43 3/4	WANG LABS.	+ 1/2	+ 1.16
N	115- 87	87	XEROX CORP	- 7	- 7.45

LEASING COMPANIES

EXCH	1970 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE
O	9- 6	8 3/4	BANISTER CONTIN	+ 1	+ 12.90
O	25- 20	23 1/4	BOOTHE COMPUTER	- 1/4	- 1.06
O	8- 7	7 5/8	BRESNAHAN COMP.	- 1/4	- 3.17
O	8- 6	6	COMPUTER EXCHANGE	- 1/2	- 7.69
O	18- 6	6 1/2	COMPUTER LEASING	- 2 1/2	- 27.78
O	15- 8	10 1/2	CYBER-TRONICS	+ 2	+ 23.53
N	32- 19	20	DATA PROC. F & G	- 1 3/8	- 6.43
O	8- 4	6 1/2	DATRONIC RENTAL	+ 1/4	+ 4.00
A	24- 18	20	DEARBORN COMPUTER	- 3/4	- 3.61
O	8- 6	8 1/8	DIEBOLD COMP. LEAS.	- 1/8	- 1.52
A	10- 6	6 1/4	DPA, INC.	- 1	- 13.79
A	22- 14	17 3/8	GRANITE MGT	+ 1/8	+ 0.72
A	14- 11	11 1/2	GREYHOUND COMPUTER	- 1	- 8.00
N	30- 16	17	LEASCO DATA PROC.	- 2	- 10.53
O	5- 4	4 7/8	LECTRO COMP LEAS	- 5/8	- 11.36
A	19- 7	7 1/2	LEVIN-TOWNSEND CMP	- 1 3/4	- 18.92
O	4- 2	2 1/2	MANAGEMENT ASSIST	- 1/8	- 4.76
O	8- 6	8	NCC LEASING	+ 1/8	+ 1.59
O	8- 5	5 1/2	SYSTEM CAPITAL	---	----
A	19- 13	18	U.S. LEASING	- 5/8	- 3.36

PERIPHERALS & SUBSYSTEMS

EXCH	1970 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE
N	62- 42	45	ADDRESSOGRAPH-MULT	- 1 7/8	- 4.00
O	15- 7	7 1/8	ALPHANUMERIC	- 1/2	- 6.56
N	48- 33	35 1/8	AMPEX CORP	- 2 1/8	- 5.70
O	18- 9	10 3/4	APPLIED LOGIC	+ 1/4	+ 2.38
A	34- 8	11 5/8	ASTRODATA	+ 1 3/4	+ 17.72
O	11- 8	8 3/4	BOLT,BERANEK & NEW	- 1/4	- 2.78
N	14- 11	13	BUNKER-RAMO	- 1/8	- 0.95
A	33- 23	26 1/2	CALCOMP	- 1 1/2	- 5.36
O	13- 8	9	COGNITRONICS	- 1/2	- 5.26
O	12- 8	11 1/2	COLORADO INST.	- 1/2	- 4.17
O	36- 27	33	COMPUTER COMMUN.	+ 4	+ 13.79
A	12- 7	7 1/2	COMPUTER EQUIPMENT	- 3/8	- 4.76
A	27- 20	26 1/2	COMPUTEST	+ 1 5/8	+ 6.53
A	25- 17	18 3/8	DATA PRODUCTS CORP	- 1 3/8	- 6.96
O	23- 16	19 1/4	DATA TECHNOLOGY	- 1/4	- 1.28
O	13- 8	8 3/4	DIGITRONICS	+ 1/4	+ 2.94
N	40- 23	25 7/8	ELECTRONIC M & M	+ 1/4	+ 0.98
O	8- 5	5 3/4	FABRI-TEK	- 1/4	- 4.17
O	17- [illegible]	5	FARRINGTON MFG	- 5 3/4	- 53.49
O	7- 4	6 1/4	GRAHAM MFG.	---	----
O	20- 14	16 1/2	INFORMATION DIS	+ 1/2	+ 3.12
A	67- 33	35 1/4	MARSHALL INDUSTRIES	- 5 1/8	- 12.69
A	84- 58	72 3/8	MILGO ELECTRONICS	- 1 1/8	- 1.53
N	87- 55	60 1/2	MOHAWK DATA SCI.	- 1/4	- 0.41
O	52- 24	32	OPTICAL SCANNING	+ 5	+ 18.52
O	17- 10	10 3/4	PHOTON	- 5/8	- 5.49
O	4- 2	3	PHOTO-MAGNETIC SYS.	+ 1/4	+ 9.09
A	42- 27	39 7/8	POTTER INSTRUMENT	- 1/4	- 0.62
O	25- 15	19	PRECISION INST.	- 3/4	- 3.80
O	83- 45	48	RECOGNITION EQUIP	---	----
O	34- 25	30	REDCOR CORP.	+ 1 1/4	+ 4.35
N	29- 14	15	SANDERS ASSOCIATES	- 2	- 11.76
O	53- 25	26	SCAN DATA	---	----
O	23- 17	19	TALLY CORP.	- 1/2	- 2.56
N	159- 90	133 7/8	TELEX	+ 5 3/8	+ 4.18
O	50- 27	34 1/2	VIATRON	+ 1 1/2	+ 4.55

SOFTWARE & EDP SERVICES

EXCH	1970 RANGE	CLOSING PRICE		WEEK NET CHANGE	WEEK % CHANGE
O	6- 4	4 1/2	ADVANCED COMP TECH	---	----
A	24- 7	7 5/8	APPLIED DATA RES.	- 7/8	- 10.29
O	8- 3	3 1/2	ARIES	---	----
A	47- 35	40 3/4	AUTOMATIC DATA PRC	+ 1/8	+ 0.31
O	14- 8	10 1/2	AUTO SCIENCES	+ 1 1/4	+ 13.51
O	9- 4	5 1/2	BRANDON APPL SYS	+ 1/2	+ 10.00
O	3- 1	1 3/4	COMPUTER AGE INDUS.	---	----
A	12- 6	7 7/8	COMPUTER APPL	- 1/4	- 3.08
O	14- 8	9 1/4	COMPUTER ENVIRON	+ 1/4	+ 2.78
NAT	10- 3	10 1/4	COMPUTER INDUS.	- 1/4	- 2.38
O	13- 5	9	COMPUTER NETWORK	+ 3	+ 50.00
O	15- 12	13 3/4	COMP. PROPERTY	---	----
N	34- 20	21	COMPUTER SCIENCES	- 2 3/8	- 10.16
O	8- 5	7	COMPUTER USAGE	+ 3/4	+ 12.00
A	75- 49	49	COMPUTING & SOFT	- 7	- 12.50
O	9- 6	7 1/4	COMRESS	+ 1/4	+ 3.57
O	14- 5	7 1/4	COMSHARE	- 1/2	- 6.45
O	3- 1	1 1/2	CONSOL. ANAL. CENT.	- 1/8	- 7.69
O	24- 14	14 1/2	DATA AUTOMATION	- 1/2	- 3.33
O	28- 18	19 3/4	DATA PACKAGING	+ 3/4	+ 3.95
O	6- 3	3 7/8	DATAMATION SERVICE	+ 1/8	+ 3.33
O	9- 5	9	DATATAB	+ 1	+ 12.50
O	4- 2	3 7/8	DIGITEK	- 1/8	- 3.12
O	13- 9	11	EDP RESOURCES	- 1/4	- 2.22
A	11- 8	9	ELECT COMP PROG	- 1/8	- 1.37
O	161-144	160	ELECTRONIC DATA SYS.	+ 1	+ 0.63
O	20- 13	13 3/4	INFORMATICS	---	----
A	25- 12	15	ITEL	- 1 1/2	- 9.09
O	7- 3	4	LEVIN-TOWNSEND SERV.	+ 3/4	+ 23.08
A	25- 18	20 3/8	MANAGEMENT DATA	- 5/8	- 2.98
O	8- 5	5 3/4	NAT COMP ANALYSTS	---	----
O	12- 3	12 3/4	NAT.COMP. SERV.	+ 2 1/4	+ 21.43
N	53- 31	32 7/8	PLANNING RESEARCH	- 7 1/8	- 17.81
O	27- 17	18	PROGRAMMING METHODS	- 1	- 5.26
O	5- 3	3 3/4	PROGRAMMING & SYS	- 1/4	- 6.25
O	33- 15	15	PROGRAMMING SCIENCES	- 2 1/2	- 14.29
N	14- 6	8	SCIENTIFIC RESOURCES	- 1/8	- 1.54
O	2- 1	1 3/4	SOFTWARE SYSTEMS	- 1/8	- 6.67
O	3- 2	2 1/4	STRATEGIC SYS	+ 1/8	+ 5.88
O	27- 15	17	TBS COMP CENT INC.	---	----
O	4- 2	4 1/8	UNITED DATA CENTER	- 1/8	- 2.94
N	99- 35	35 7/8	UNIVERSITY COMP.	- 7 5/8	- 17.53
A	20- 9	10	URS SYSTEMS	- 7	- 41.18
O	13- 7	10 1/4	U.S. TIME-SHARING	- 1/2	- 4.65

New Registrations

DATA SYNETICS CORP., 41 B Street, Burlington, Mass. 01803, a company that is concentrating its efforts on the design, development, manufacture and marketing of computer-based systems in commercial and government data processing, filed to register 250,000 shares of common stock. Proceeds, at $10 per share, intended for the repayment of loans, for financing the cost of work-in-process and inventory of its Magnescriber components, for recruiting, training and establishing an expanded sales and service organization, for publicity and advertising, for financing the cost of selling, producing and installing its Magnescriber systems, and for designing and testing software programs for expanding the capabilities of the Magnescriber. The underwriter is Robert Cea & Co., Inc., 160 Broadway, New York, N.Y.

TELEMODEM, INC., 98-05 217th St., Queens Village, N.Y. 11429, a company that is engaged in the design, development, manufacture and sale of telecommunication and data handling equipment and systems, having application in the communications and data transmission fields, filed to register 150,000 shares of common stock. Proceeds, at $6 per share maximum, intended to complete development of a line of "data modems" for the telecommunication industry, to develop a commercial line of error control and correction equipment for use in high-speed data communications, to adapt its multiplex telegraph and its voice-plus data terminals for commercial markets and to implement an advertising and marketing program for its new products; the balance will be added to the company's working capital and used for general corporate purposes. The underwriter is Kluger & Ellis.

COMPU-TECH SCHOOLS OF AMERICA, INC., 200 West 51st St., New York, 10019, a company that is engaged in acquiring all of the outstanding stock of New York School of Computer Technology, Inc. and establishing additional computer programming schools and developing and marketing home-study courses in computer programming, filed to register 200,000 shares of common stock. Proceeds will be reserved to redeem its 7 1/2% subordinated convertible debentures at 104% of principal amount; a portion will be reserved for the initial costs and expenses of opening approximately 10 additional schools in principal cities of the U.S. and for the completion, printing and promotion of the home-study correspondence course; and the balance will be added to the company's working capital and used to finance student tuition, to increase advertising and publicity, to expand its staff and for other corporate purposes. The underwriter is Mayflower Securities Co., Inc., 32 Broadway, New York, N.Y.

STATISTICAL COMPUTING CENTER, INC., 2501 N. Stiles, Oklahoma City, Okla. 73105, a company that is engaged in providing data processing service primarily to fire and casualty insurance companies and credit unions, filed to register 300,000 shares of common stock. Proceeds, at $4 per share, intended to retire the company's note on its Honeywell 1250 computing system, to retire the company's outstanding debentures, to continue development of its insurance packages, to develop other real-time packages and to cover start-up costs involved in merging or acquiring two additional centers in other eco-geographical areas; the balance will be added to the company's working capital. The underwriter is R. J. Edwards, Inc., 2205 Liberty Bank Bldg., 200 N.Robinson, Oklahoma City, Okla.

WABASH COMPUTER CORP., 3003 North Central Ave., Phoenix, Ariz. 85012, a company organized to acquire the businesses formerly carried on by Peripherals, Inc., and Information Network Corp., two wholly owned subsidiaries of Wabash Magnetics, Inc., filed to register 200,000 shares of common stock. Proceeds, at $10 per share maximum, intended for the opening of two branch offices to market computer time-sharing services, for the purchase of capital equipment required for the development and production of certain types of computer disk memory equipment, for the further development of the computer disk memory equipment and development of other equipment, and for the further development of programs used in the computer time-sharing operations; the balance will be added to the company's general funds and used for general corporate purposes. The underwriter is Burton, Dana, Westerlund, Inc., 120 Broadway, New York, N.Y. 10005.

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